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PRACTICAL

PORTRAIT PHOTOGRAPHY.

A HANDBOOK FOR THE DARK ROOM, THE SKYLIGHT,
AND THE PRINTING ROOM;

BY
WILLIAM HEIGHWAY.

NEW EDITION.

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PREFACE TO THE SECOND EDITION.

THE rapid sale of the first edition of these hints on Portrait Photography, and the continued demand for copies, has proved how much required is a cheap work of convenient reference. Recognizing this, I have striven to make the present issue as thoroughly reliable in detail and simple in description as possible, that it may be of real and lasting service to its readers.

I have taken advantage of the reprinting to dispose the matter into sections, an arrangement which, without disturbing the sequence of the manipulations, has brought together the chapters more perfectly under their several departments, and thus will facilitate reference.

WILLIAM HEIGHWAY.

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INTRODUCTION.

In a study of photographic literature the reader cannot but be struck with the strange diversity of thought and method in the treatment of almost every detail—chemical or manipulatory—of every branch of photography; and the beginner, and not unfrequently the finished scholar, in trying to follow out the theories and advice of these teachers, has been thrown into a very undesirable state of “fog,” whence to extricate himself he has been forced to take charge of the helm for himself, if his knowledge was sufficient, or, as is not seldom the result, to give up in despair. There is, of course, as those who have succeeded know well enough, a great deal that must be studied individually, and a point where the best book ever written, as an ally, deserts one. A feeling of independence and spirit of self-reliance are, therefore, indispensable to the student who would excel, and these are only to be attained by thought and careful study.

While success is the reward of patience and studious research, there are still the majority who will ever remain in the rank-and-file, who will ever need counsel and advice; and for these it is necessary to provide simple and intelligible rules of working, and furnish them with for-

mulae which, in following, will enable them to over-step the discouraging impediments which beset the first steps of progress in our art.

It shall be my endeavour, in placing these before the reader, to do so in as simple language as possible, without any mystifying technicality, and with just sufficient theory to explain *why* each manipulation is conducted, and so let the student pursue a course, not because it is so set down, but intelligently, as a means to a certain end, the which he fully understands. This plan, it appears to me, is not only one called for by intelligent pupils, but a simplification of tuition. First, what has to be done; that understood, how it can be done; and why the means adopted are the best.

I propose, as my plan, to take the reader by the hand, and conduct him step by step through the various manipulations and processes, just as if he were a pupil in a gallery; to fight his way, as the writer has done, from glass cleaning, where he learns his first great lesson that

NOTHING CAN BE DONE TOO THOROUGHLY!

He will then be introduced to the Dark Room, the construction of which will be explained, the work there described, and how to do that work in the best way. The chemicals will next be brought under his notice, and their use and properties explained, in order that his dark room manipulations may not be gropings in the dark indeed.

I shall take advantage of this opportunity to impress on the reader, that whatever may be of value in these pages, may be rendered of no service if, after a careless perusal, it is thrown aside, or by the adoption of a loose and inefficient method of practising the directions here set down, or a slovenly and dirty manipulation.

INTRODUCTION.

PRECISION

is absolutely necessary. How is it possible to judge the effect of a formula without a strict adherence to the quantities and directions given?

How often we see an operator, in the perusal of a book or journal of his art, come upon a formula which promises well; say a developer, than which there is hardly a more delicate agent, liable as it is to variation by heat or cold, or any trifling change in the proportions of the ingredients. In consequence of his discovery of a new developer, he takes his proto-sulphate of iron, perhaps kept in a brown-paper bag which has burst, or in an imperfectly-stoppered bottle, and is, consequently, so oxidized as to have assumed a rusty-grey powdery appearance. In weighing out an ounce, he may put in an extra crystal or two. He solaces himself with the thought "that just turns the scale," and proceeds in like haphazard manner to measure out the acid. Water he scarcely thinks worth taking the trouble to measure. He feels satisfied, and with a too easy conscience proceeds to try this thoroughly original developer. If it answers, he feels pleased, and a glow of self-satisfaction comes over him; but reproduce it he cannot! Or if, as is most likely to be the case, it does *not* answer his expectations, and the promises made (for the developer *he has not made up*) are not realized, he throws it away with the angry remark, "I never did learn anything from these books; shan't try any of their formulæ again"—which is a very wise determination to come to in such a case.

But it may happen that he may have taken every care as regards the proportions of the ingredients, weighed and measured them out with exact nicety; but he is not a believer in that principal of photographic virtues,

CLEANLINESS.

Some foreign substance has been mixed up with the solution, caught up with the iron, organic matter in his bottles, or from his fingers. Then, in the test, the collodionized plate is stained with marks of his dirty fingers; he throws a quantity of the developer over the plate, allowing most of it to spill into the sink, carrying with it most of the silver from the plate, the retention of which is so necessary to a proper determination of the value of the formula—indeed of beauty of the negative—and the result is stains, streaks, spots—and disgust.

The student cannot too early or too thoroughly learn these two cardinal virtues of precision and cleanliness. Their influence is observable in every movement of the first-rate operator: the neatness of his person so far as the nature of his work will permit, and in the order, cleanliness, and readiness of every camera, lens, chemical, bath, solution, and what not under his care; and the neatness of the reception, operating, and dark rooms—these are the evidences; the result is perfection. I do not by any means intend to say that a clean and careful operator is always a clever one; but with these qualities he is always at his best, while the talented slovenly man is at his worst. Even if it does sometimes appear that a worker admired for his success in dark-room or printing department is not so painstaking as he might be, this is more apparent than real, for some of the hard rules binding on the learner are of necessity relaxed by the master of his business.

Cameras should always be ready for use, free from dust, and in good repair. Spare lenses should be placed where they are not liable to get injured. The posing chairs and accessories of the glass house, kept free from dust and

stains, last longer, and present a better appearance to the sitters, than when neglected or badly used. When it is necessary to move a chair, background, or headrest, it can be done as expeditiously quietly, as with great noise and violence, which not only annoy your customers, but destroy your property.

Order and neatness should reign in the chemical room, and are observable in the arrangement and legible labelling of all bottles and other vessels. Funnels should be kept clean and to their proper use, and the filtering-paper ready at hand. In the dark room, which may have to serve as a chemical room also—*though this should not be if it is possible to set aside a separate apartment for the reception of chemicals*—there is great scope for the display of neatness and convenience of arrangement. The carriers should stand near the silver bath, which should be kept well covered, when not in use, to preserve it from dust.

On a shelf over or beside the sink should be kept the developing solution and the developing glass, free from dirt and crystals of iron, which will collect round its sides if it is not constantly cleaned. From this cause alone many negatives have been ruined. The collodion bottles, handily placed, ought to be well looked after; the lip of each bottle, on which the collodion collects, should be wiped each time after using, thus guarding against many of the spots and stains which so trouble operators. Above all, the floor of the dark room ought to be very clean (never swept, but cleaned with a damp mop every morning), that in moving about, the operator does not raise a cloud of dust, the particles of which find their way into bottles and solutions, on to coated plates, &c., and create mischief in a thousand and one ways. Order and cleanliness, in short, should reign supreme.

I am sure no thoughtful reader needs further examples

of the mischief done by the neglect of these rules. If the consequences in his own business are not serious enough, let him think of the effect of an overdose of a drug administered by a chemist in making up a prescription, and in many other ways he may think of in a moment,—and let him take the lesson to heart.

I hope this little sermonette has not been preached in vain, but that its lesson will show its work as we go on with our studies.

The dark room work mastered, so far as it can be at this early stage, the student will be introduced to the glass house, to learn its construction, the effect of light on the salts of silver, lighting the figure, and the general work of this department, with a few hints on artistic posing.

On the head of posing and artistic treatment in photography I shall be content to give only some general rules, leaving the higher perfection of the student to his own knowledge of art, and many splendid works already written on the subject—notably Mr. Robinson's book on "Pictorial Effect in Photography,"* which every photographer with ambition to excel ought to possess.

Printing the negative will next engage the attention of the reader; but in this, as indeed in most of the manipulations and processes of our art, practice is the great thing necessary. It is much easier to explain orally, and show the pupil how to do a thing, than it is to write plain and understandable instructions; and it is in this respect that all books of instruction in our art fail to a very great extent.

I reiterate my hope that every reader of this work will study it carefully, and—what is so necessary in all books of instruction—assure himself that he has thoroughly mastered one chapter before he passes to the next.

* Published by PIPER and CARTER, Gough Square, Fleet Street, London.

PART I.—THE NEGATIVE.

CHAPTER I.

SELECTION OF GLASS FOR NEGATIVES—METHOD OF CLEANING THE PLATES—PREPARATION OF THE ALBU- MEN—THE DARK ROOM.

I PURPOSELY abstain from giving anything like a history of the birth and progress of our art—still in its infancy, but yet such a vigorous and promising juvenile—not because I by any means deem it uninteresting or uninstructive, but for the reason that such histories have been so often and so well written, and that in all probability my reader has already studied at least one of them. If he has not, he will find entertaining and improving matter in the study, and thereby gain some idea of the difficulties gone through by the early workers, the progress they made, and the perfection to which they have brought the art they served so well.

Without losing time, I will request the reader to study these details at his leisure, and give me his attention to master the first lesson of the gallery: that of cleaning the glass plate which is to be used to receive the impression of light on the sensitized collodion film.

The Selection of Glass for Negatives.—The best, it is needless to say, is always the cheapest, and economy in this particular is almost always very expensive. But it is necessary in this, as in everything else, to allow the purse to have something to say. It is certain that with the old process of polishing the glass a finer quality was necessary than where they are albumenized—a process I am going to advocate, if it need it. It is wise to select a size which will admit of a good margin beyond the picture, for the reason that stains and spots are generally on the edges, and thus your negatives are cleaner and finer for having this margin. If it be possible, it is well to have a plate which will fit the carriers of the card and cabinet cameras. There is, it will be seen, a great (apparent) waste in this plan, but if it save one valuable negative a day (and it does more), you are more than repaid. I like to see a glass 8 inches by 10 inches, for two C.D.V. or cabinets, on which, if necessary, as in the case of children, you can take four pictures.

It is advisable, on opening your box of plates, to reject all pieces that are (1) very much curved, (2) containing bubbles and like imperfections, (3) rust and grit, (4) scratches, (5) those with broken or cracked corners, (6) those plates that by reason of being so thin, are sure as negatives to be broken. Reject all that are not perfect enough for your most prized negatives, for in the hurry of work you cannot stop to choose your plate. Every piece should be fitted into the carrier, for nothing is so annoying as to find, when a plate has been coated and sensitized, that it is too large or too small to rest in the carrier.

The Method of Cleaning the Plates.—Having ascertained that each piece of glass is perfect and properly fits the carrier, roughened round the edges to guard against cutting

the hands while handling the plates, and then rinsed under the tap to remove from their surfaces the dust and straw of its packing, they are placed, *one by one*, into an earthen pot of undiluted commercial nitric acid, that the acid may gain free access to all parts of the glass. With new glass, an hour or two will be sufficient. They are then thoroughly washed under the tap, and albumenized.

Preparation of the Albumen.—Dissolve the white (perfectly free from germ) of one fresh egg—ordinarily about an ounce—in twenty ounces of water. A large stoppered bottle is the best thing, in which is placed half a handful of broken glass; this, when the bottle is shaken, serves to cut up the albumen, so that it mixes with the water. When shaken into a stiff froth, pour into a filter of clean sponge or cotton, that the clear liquid may run through into a clean bottle. This solution should be *perfectly* clear, but with the eggs not perfectly fresh it generally presents a milky appearance. In this case add a few drops of ammoniæ. This will in most cases clear it perfectly; if it does not, a second filtration will accomplish it. For pouring the albumen on the plate, a graduated measure will be found handiest. The plate has been cleaned in the acid and washed, and should not have been allowed to dry, as stains so often appear from unequal drying, which it is afterwards impossible to remove. For albumenizing, however, it is imperative that the plate be wet and clean. To insure against grit from the running water, tie up the tap at which you are washing with two or three thicknesses of clean linen to act as a filter.

To albumenize the plate hold it horizontally, resting on the edge of the first finger, the thumb over the edge of one corner holding it firm. (See diagram and directions for holding plate when coating with collodion.) At the corner, diagonally opposite that held, the albumen is

poured on, the graduated measure being brought as nearly as possible, without touching, to the surface of the glass, to prevent splashing. The plate is tilted that the solution runs towards the opposite corner, then to that held by finger and thumb, and finally allowed to drain off at the other corner. Do not touch the thumb with the solution, which you can see driving the water before it, and do not suffer it to run over the edges. The beginner will on his first trial recognize the fact that although this sounds easy enough, the performance is by no means a simple one until experience has been gained. Indeed, it is almost absolutely necessary in this operation, as well as in coating the plate with collodion, and cleanly covering the exposed plate with developer, to see it done by an experienced operator, before success can be attained.

The plate is, when albumenized, placed in a rack, the corner at which the albumen has been allowed to run off being placed lowest, that it may drain and dry spontaneously. The surplus albumen has been allowed to run into the sink, as from its inexpensive character it is not worth preserving.

As the surfaces of the plate after albumenizing are exactly similar in appearance, and it is extremely difficult to tell which side has been coated, the plates should be placed in the rack on an uniform plan, that the coated surfaces face one way. Not to trust to the memory, stick a little piece of paper on the *uncoated* surface of the end glass, so that you may tell which way they are placed when you come to them again. When perfectly dry you may place them together without fear of injury. Stand them on end in your cupboard—albumen side inside—ready for use. *Guard against damp.* Stood up close together they are more secure from dust than in a rack, and it is only dampness, a fatal enemy, you have to guard against.

If a doubt should at any time arise as to which side has been albumenized, you have only to breathe on the glass : on the uncoated surface the breath lingers some time, but scarcely an instant on that side coated.

For Old and Used Glass it is necessary to have a strong solution of concentrated potash. As with the acid, this solution must cover the plates perfectly. In about twelve hours the old varnished films will float off under a stream of water. The plates are then immersed in the acid solution, and, after a rather longer stay in it than in the case of new glass, they are treated in the manner already described for new glass.

There still appears to linger some prejudice against the albumenizing of glass plates—a groundless one, I venture to think. It is urged that the ammoniæ which it is necessary, in most cases, to use in the albumen solution, and the albumen itself, injure the silver bath. I never found it so, and, if it is done carefully, cannot see how any of it can touch the silver solution, as the substratum of albumen is entirely covered by the collodion film. The method, however, saves so much unpleasant and really hard work, and is so uniformly certain in working, that it more than compensates for the little injury, if any, done to the silver bath.

In reply to some objections raised on the appearance of the first edition of this book, that albumenizing would not answer in the hurried work of a gallery, I would state that I have assisted in a gallery where on an average thirty negatives were made daily—all on albumenized plates ; indeed, I think no other plan would be so successful.

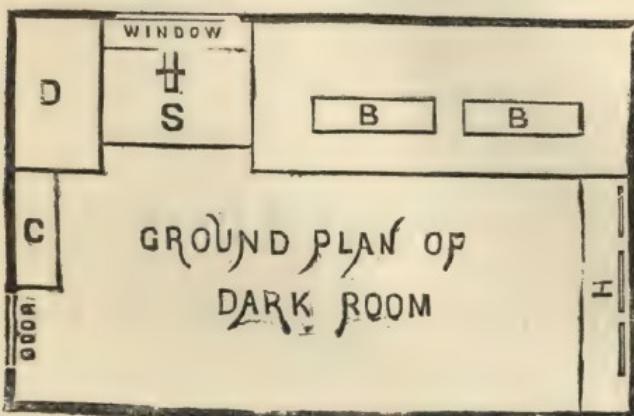
The learner having seen how to coat his glass plates with albumen, and having acquired skill and facility in that most important operation, we may safely introduce him to

the scene of his future trials (certain) and (let us hope) triumphs—

The Dark Room—that he may study its construction and understand the work of its various parts. First it will be observed that it is dark only in name. The door closed, he is able to read in any part of it, but the light is coloured orange or yellow. It is necessary to exclude all white or actinic light. No cracks must be left open; doors must fit well, and every place of ingress of white light be carefully guarded. The dark room should also, if there is any chance for such a distinction, be the most orderly and cleanly room in the gallery, and with as few shelves as possible, for they harbour dust. The less room (consistent with ease and comfort of working) allotted to this department the better. It should have a convenient and ample supply of water well under control; a large tank or trough occupying the middle of one half of the side of the room; on each side a shelf—one for the bath, but well out of reach of splashings from the water, developing, and so on—and the other for the developer, developing glass, intensifying solution, and silver. In addition to these, all that is requisite in this room are collodion pouring-bottles, the negative glass, and the carriers.

In the plan given on page 13, C is the little shelf for collodion and glass plates, near the door, that in coating the plate the operator may have light. The plate coated, he turns round, and two steps bring him to BB, the baths, into one of which he slowly and steadily, without stoppage, lowers the collodionized plate. Properly coated, the plate is withdrawn and placed in the carriers or holders at H, then taken out to the camera. The exposure made, the operator returns the carrier to its place at H, takes out the plate, which he develops over the sink, S. Water is here

laid on, the fawcet, F, being conveniently to hand. The operator in a dark room of this construction has not to



race all over the room at each process, but can quietly, and without disturbing any dust, follow each manipulation by walking only a step or two at a time.

CHAPTER II.

THE DARK ROOM: ITS FITTINGS—THE CHEMICAL ROOM.

The manipulations of the dark room are so important, and their success is dependent on so many apparently trivial circumstances, that it will be well for us to consider, while on the subject of this department, how to secure a room as nearly perfect as possible. In many cases, of course, the room is already set out and fitted up according to the ideas of some former tenant; or, if building for yourself, it may be found that your ideas must be modified considerably to suit the accommodation at your disposal. It is my plan to give an idea for a dark-room as it should be, and leave it to the intelligence of the reader to follow it with such modifications as circumstances demand, or his ingenuity devise.

It should certainly be in the immediate vicinity of the skylight, for quickness and success of working; and this consideration should outweigh many even grave objections to its immediately adjoining the glass house. So many dark rooms are to be found that are thoroughly unadapted to the purpose for which they are designed (?), that if the reader has ever attempted to work in them he will recog-

nize the great necessity of placing it certainly on the same floor as the glass house, and easy of access.

The room should be wholly lined with wood closely fitted and without crack or aperture to admit actinic light. Its ceiling and walls should be painted in oil, to allow of dust and dirt being wiped off as occasion may require. Do not fall into the fond error that shelves are "so handy." A shelf for the plate-holders, one for the glass plates and collodion pouring-bottles, and one handy to the sink for the developer and strengthening solutions, are as many as you require; others only harbour dust, and tempt you to make use of the dark room as a common receptacle for rubbish. Everything like chemicals, bottles, old negatives, &c., &c., must be banished—*everything* but that immediately appertaining to your work. Dust is one of your most insidious enemies, therefore you paint your walls and ceiling, because paint does not retain it so readily as paper and rough wood, and is easily cleaned, consequently you are not constantly troubled with dust falling from walls and ceiling. For the same reason you have only those shelves you absolutely require, they being easily kept clean, and you have not the temptation to bring round you a choice collection of rubbish.

The size of the room is a very important consideration. Let it be as small as possible, consistent with comfort; one eight feet by ten or eleven ought to be ample for almost any amount of work. This room should be kept most scrupulously clean, and for this purpose a mop should be used every morning to clean the floor. Sweeping is objectionable, as it raises dust that troubles you long after the operation. A sash about two feet square, glazed with orange yellow glass, should be let in immediately over the tank, the light of which allows you to watch the development of your plate. See that this window is neither

too high, rendering it useless, nor so low that in working you are compelled to stoop and bend over it. Comfort and health are things which should be studied in photography, at least, as there is in its practice quite enough to try the patience and constitution. The sash is to be provided with flaps or shutters, light frames covered with yellow paper, that may be easily let down to cover the window when it is necessary to shut out a portion of the light. By all means have a window which is openable when not in use, for the purpose of ventilating the apartment.

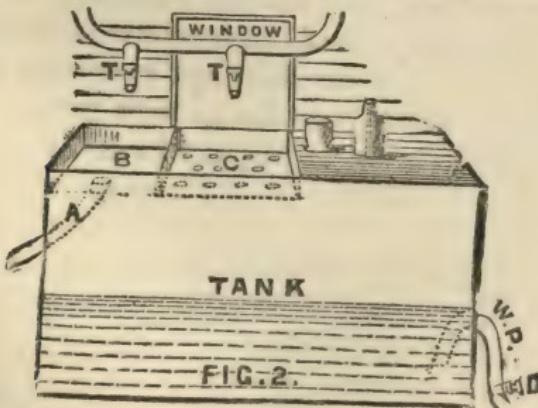
Where it is not possible to have a window at which to develop, the only thing left to you is to have a shaded gas-burner fixed a little lower than the level of the plate in your hand.

The shelf for the plate-holders should be covered with several thicknesses of blotting-paper to catch any drippings of silver (which should be few) from the plates. These sheets are preserved when they are taken up as being dirty or full of silver, to be sent to the assayer to extract the silver, and fresh ones put in their place.

The tank should be of sufficient capacity for a day's work, that all the washings may be kept till the end of the day to be precipitated, and to allow of the clear water to be drawn off the first thing in the morning. The tank may stand about three feet high, and rest on the floor, eighteen inches in width (so that the window, the illumination of which aids you in determining the development, may not be too far off), and as long as you can spare space for. The water with which you wash off the developer at the point of proper delineation is admitted from a reservoir by a pipe holding the tap placed conveniently under control, which should admit of a clear and plentiful stream running without spluttering. There should also be fixed another

tap over a little tray, independent of the main tank, at which you can wash the negative when fixed, *the soda or cyanide washings being carried away without passing into the tank*. But of this further, when the subject of manipulation engages our attention. The tank should be fixed with a false bottom, making a tray eighteen inches deep for the reception of used glasses. This false bottom is perforated with holes, through which the water runs, leaving the tray dry; below is fitted a waste-pipe let into the tank about a foot from the bottom, the end inside the tank being carried down to within two inches of the bottom, by which means, in letting off the waste, the silver deposit at the bottom of the tank is not disturbed. Of course it will be seen that for this pipe to empty the tank to the level of the end inside the tank, it must be lowered on the outside to the same level; and fitted with a tap, that the washings may be retained till they can be precipitated with a saturated solution of copperas, a common salt of iron.

The accompanying little sketch will explain the arrangement of the tank, which must of course be perfectly water-



tight. TT are the taps at which the negative is washed; that over tray C for the negative after development, the washings running into the tank; and the tap T over tray

marked B, for washing the negative after fixation, the washings of which run away down the pipe indicated (A) on the left of the diagram. The pipe on the right (W P) is the waste-pipe of the tank, the tap (D) at the bottom retaining the contents of the tank till it has been precipitated with the saturated solution of copperas.

The dark room should be kept as nearly as possible at an even, comfortable temperature all the year round, as much for the sake of the work as of the worker. A little stove should be used in the winter to warm the room to about 60°, and in summer the operator should seek, by means of ventilation, to keep the thermometer from ranging into the eighties and nineties.

Much trouble is saved, and good order assured, by having an apartment appropriated to the purposes of a

CHEMICAL ROOM,

in which to boil baths, clean and albumenize glass (if you decide on accepting my suggestions in favour of this latter operation), and for keeping chemicals, bottles, graduated measures, funnels, &c., &c. A small cupboard may be fitted for the reception of the various chemicals: separate utensils, bottles, and funnels should be used for the various solutions, and should be kept to their proper use. Let all your bottles be kept clean, and be neatly labelled.

CHAPTER III.

THE NEGATIVE BATH.

THE silver baths, both "negative" (that in which the collodionized plate is sensitized) and "positive" (or bath for sensitizing the paper for printing), are often found to be very troublesome; but generally to those only who, too indolent or stupid to endeavour to obtain a proper acquaintance with their properties, are ignorant of their constitution and chemical action; to these—and let us hope there are few such among our readers—the negative bath is a constant nightmare, oftentimes bringing them to the confines of distraction. When it is "out of order," as it usually is, if it can ever be said to be in order, its disorders are extremely varied in character, and vexatious to the operator, who is at a loss as to the cause. One operator finds his bath is addicted to that unpleasant habit of "fogging," and of this alone there are several species—an universal veiling of the plates in lights as well as shadows, though of course it is not so perceptible in the former as in the latter; and in some cases entirely obliterating the image on the plate, and in others only blurring the shadows. The bath of another worker may produce negatives too thin or weak, or with insufficient contrast. A

troublesome deposit, causing minute holes in the negatives, called "pinholes," is also another sign that the bath is out of sorts; while how many operators have been driven to the verge of insanity by dreadful streaks and stains, the which they knew not how to get rid of! None can be entirely free from these visitations at times, but the operator of intelligence can generally determine the cause, when it is easy in most cases to remedy the defect.

One of the most fruitful causes of trouble in the negative bath is, as I have taken occasion to state before, in having too small a bath-holder, by which severe loss is suffered in many ways. In the first place, it can only be worked a short time before it gives signs of becoming disordered. Secondly, as it is out of order, it must be renovated, and this entails time wasted, trouble, and loss of silver in pouring from vessel to vessel, in boiling and filtering, and therefore this loss has to be made up by the addition of new silver, which is sure to disturb the harmonious working of the bath, and entails on the operator the horrors of continual uncertainty. The fourth, and by no means the least, objection to a small bath, is the fact that it is likely to get out of order at any moment, and at just the moment when you want it most. It may be said, with great truth, that the same may be expected of any negative bath, however large; but with a bath of good size (say three gallons) calculation may be made with some degree of certainty by the amount of work done, when this is likely to happen, and steps taken accordingly. It may be further urged that a new bath should be ready to take the place of the disordered one, and is equally necessary with a large as with a small bath. Very true; but as a new bath is never so good as one a little in use, the less often you have these untried servants the better. A silver bath continues to improve up to the

very moment of its decay. A small bath, too, is soon over-charged with iodide, the source of "pinholes" galore.

Need more be said? Are time and temper, worry and anxiety, nothing? If economy were in question it would be another matter, of course, because for a few shillings and pence we are content often to give our peace of mind, heaped up measure; but in this case even economy is on the side of the large bath. The larger the bath, the less change is there really in its constitution, and consequently the more certainty of working is assured.

To MAKE THE NEGATIVE BATH.

On the subject of the water for the silver bath, there is great diversity of opinion—some writers and operators declaring that nothing but distilled water should be used, others recommending rain water. Many others affirm (and the author agrees with them) that, generally, ordinary cistern water is sufficiently pure. It will be found in this book that the method of making up and purifying bath solution is based on this experience, that in general (unless great impurity is known to exist) ordinary cistern water is pure enough.

Dissolve, in the bulk of water you require, nitrate of silver, until the hydrometer when placed in it marks thirty grains. One-half of this solution should then be poured into another vessel, and iodized by adding to it ten or twelve grains (according to the quantity of solution) of iodide of potassium or ammonium, which it will be found will turn the silver solution to a milky colour, and a slight precipitate may be observed. Filter the uniodized solution, and into this clear solution filter the iodized portion. Observe this order of procedure, because by

reversing it and filtering the uniodized portion last, it takes up from the filtering paper the surplus iodide left behind from the iodized solution, and the consequence is an approach more or less closely to a fully iodized bath, a thing you do not, of course, desire. This bath solution should be quite clear.

If you do not require to use this bath at once, it should be placed in a clear "white" glass bottle, and placed in the light and sun. It should first be ascertained whether the solution is acid or alkaline : if acid, blue litmus paper will turn more or less red according to the amount of acid in solution, and liquor ammoniæ should be added to the solution (carefully shaking the bath to mix it thoroughly after each drop of ammoniæ added) until the silver solution, on being tested with litmus paper, shows no trace of acid ; that is, when *blue* litmus paper does not change colour, and *red* paper changes to the colour of the blue paper. It is safer, in using liquor ammoniæ for this purpose, to put a few drops in an ounce of water, by which means you have more command over it ; also in the operations of adding ammoniæ or acid to a bath, it should be thoroughly mixed up before testing and adding more, or you are likely to overdo it.

The bath, slightly alkaline, then, is placed in direct sunlight, and after a short time it will grow black and inky, the organic matter, existing in the water, being in solution, and afterwards deposit this organic matter as thick mud at the bottom of the bottle, while the solution will become clear as crystal. This should then be filtered quite clear, and can be acidified with nitric or acetic acid.

In the choice of acids there is great difference of opinion, some operators inclining to a preference for nitric acid, others never using anything but acetic acid for this purpose. I cannot say that I ever detected any difference

in the baths made up with these two acids, but I have generally used nitric. It can be said in favour of this, that if a new bath shows signs of acidity in its first state as silver and water, it will most probably be from the acidity of the silver salt, thus denoting the presence of nitric acid, and it seems reasonable that that acid should be the one we choose ; and, too, the same acid is liberated in the bath from plates coated with red collodion, containing free iodine.

A perfectly neutral bath can scarcely be said to exist, chemically speaking ; but if it is what is generally called neutral or slightly alkaline, the application of the developer to the plate sensitized therein will fail to bring out any image, or it may make its appearance for a few moments, to be immediately covered universally with the deposit known as "fog."

The effect of acid in the bath is to dissolve and take up any organic matter existent in the solution, as well as to neutralize any oxide. Should too much acid be poured into the bath, place in it a piece of blue litmus paper, which will, of course, turn red ; now drop in cautiously, in the manner described in making the bath, a few drops of liquor ammoniæ ; this throws down a blackish precipitate. Be careful to stir the solution on each addition of ammoniæ, that too much be not poured in ; the gradual change of the litmus paper back to its normal colour being your guide.

Care should of course be taken to guard against the entrance of foreign substances into the bath solution, as many are fatally antagonistic to its photographic action. Of those in use in the dark room : iron (the developing agent), hyposulphite of soda, and cyanide of potassium (used for "fixing" the negative), are especially to be guarded against.

CHAPTER IV.

THE RECTIFICATION OF THE DISORDERED NEGATIVE BATH.

THE disorders to which the negative bath of nitrate of silver is subject, when properly used, are, it may be said simply and easily and surely prescribed for, and it is only when, ignorant of its character and the disorders to which it is liable, the operator gropes in the dark, that the work of restoration is uncertain and vexatious.

To guard against the necessity of constantly renovating the negative bath, it has been advised that a large bath-holder, with a correspondingly large supply of bath solution, be adopted, so that it requires little attention in weeks or even months. As it may at any moment arrive at that stage when it is found not to work properly, another bath, in working order, should be always in its place, which you can work when No. 1 becomes disordered. A third in course of renovation may, on the defection of No. 1, be restored and put in its place, while the disordered solution is treated in the manner to be described.

Whatever amount of silver you can set aside for the negative bath, be it great or little, or the baths with which you work large or small, depend upon it that it is

much the simplest plan to have three lots of solution—one in use, a second quite ready, and a third preparing; by this plan you can never be taken at a disadvantage.

The Causes of Disorganization.—Generally, the first change in the bath is caused by an accumulation of alcohol and ether, causing a repulsion of the developer when flowed over the plate. This may be remedied in two ways:—(1) As a temporary measure, by adding sufficient alcohol to the developer to counteract the repelling influence of the alcohol and ether in the sensitizer; or (2) by evaporating them by means of heat. The first method is only efficacious up to a certain point, and the presence of alcohol in the developer is not always beneficial.

For the second means, place the disordered bath solution in an evaporating dish over a stove until it commences to steam; alcohol and ether, being much more volatile than water, are easily driven off—ten minutes' steaming will be sufficient. If the solution is much reduced in quantity, and the strength at the time of taking it out of the bath-holder is not weakened (as may be ascertained by the hydrometer, an instrument by which the specific gravity of liquids is tested), the solution, by the evaporation of the water, is strengthened—there being the same amount of silver as originally, but less water—it should be reduced in strength by the addition of pure water, and filtered whilst still warm. This is done because iodide of silver is more soluble in a cold than in a warm solution, and should any iodide be precipitated by heating the bath solution (which will only be in the case of an excess, when it is necessary to reduce the quantity), it may be filtered out in this heated state; while cold it would be re-dissolved. Filtered, the solution should be perfectly clear; if not, it must be filtered again.

Fogging is the next disorder to which the bath shows

tendency ; a mistiness, or veiling in the shadows, in developing, that instead of remaining clear and bright after fixation, there is a deposit not caused by detail, which destroys the brilliancy of the negative. Fogging may arise from a variety of causes, ascertaining which, the remedy is simple. Fog may be generally classified under two heads : chemical, that caused by impurities in the chemicals ; and what is sometimes termed mechanical, as light improperly admitted to the plate (otherwise than through the lens), or from dirty glass, &c.

Taking the first, or chemical causes of fog, it may be found to veil the entire plate, lights (though not, perhaps, very perceptibly) as well as shadows. In other cases it may entirely obliterate the image. If, then, the fog is universal, veiling the entire plate, and it is found that it is removable by a gentle rubbing of the finger or a tuft of cotton, without harming the image and film beneath, this is chemical fog, and the cause is to be found in the collodion, bath, developer, hyposulphite of soda, or in the manipulation.

If the fogging is but slight, try the other bath, which, if free from the fogginess, proves, as is most likely the case, that the fault was in the sensitizing of the plate ; proceed as follows : pour the solution at fault into the evaporating dish or clear bottle. If the solution is discoloured, the probability is that dirt was the cause of the fog : remedy, filter. If perfectly clear, test for acidity ; if alkaline, add a few drops of acid. If acid, test the strength ; and if below thirty grains, boil up to that strength, and filter. If after this treatment the bath works satisfactorily for a time, and again shows signs of fogging, it may be again and again restored in like manner, until simple boiling and filtering fail to remove the organic matter with which it is charged.

Under and over-exposure, and too strong light shining

on the lens, are also causes of fogging. With too short an exposure the silver reduced by the developing agent is attracted so slowly to the image that it falls on the shadows. *Remedy, more time.* When the exposure has been too long, the reduction of silver on the application of the developer is so rapid that the operator has not time to wash it off before the silver is attracted to the shadows as well as the lights. Of course *diminution of time is the remedy.*

Temporary relief to a bath disorganized by the presence of organic matter can be obtained by adding a small quantity of a solution of permanganate of potash until the bath shows a violet colour. Place in the sun, in a white bottle, until clear, when the precipitation may be filtered out. Permanganate of potash in contact with the bath—the organic matter becoming oxidized—liberates permanganic acid, forming permanganate of silver, which remains in the bath, and is precipitated to the bottom in brownish-black flakes. The bath will require filtration and the addition of a few drops of acid after this treatment.

“Mechanical” fog can at once be detected from the chemical varieties as not being universal, but formed in irregular patches, marks, &c., and not being removable except with the collodion film. The plate, perhaps, is dirty: clean your glass more perfectly. The albumen with which the plates were albumenized may not be pure: in which case see that the eggs are quite fresh, and that the solution is filtered clear. Or the cause of fog may be found in dirty fingers or plate carriers: *remedy obvious.*

Pinholes caused by an excess of iodide in the nitrate of silver solution are very minute, of a regular crystallized form, and are distributed evenly over the entire surface of the plate. From pinholes caused by an excess of iodide those from dust are easily distinguished, being generally

larger and of irregular shape, and not scattered regularly over the plate. The causes are numerous: dust in the collodion or on the plate before collodionizing; in the bath, where the plate receives the particles on its surface; in the carrier or on the dark slide, which, on being withdrawn, sets the particles flying; in the camera, and in other ways are these kind of pinholes produced. Search out the cause, and remedy it. Those from iodide may be plainly seen on the withdrawal of the plate from the bath, covering the plate like fine sand. Sticking to the plate, they prevent the reduction of silver falling on the parts they cover, and being afterwards dissolved in the hyposulphite of soda solution, leave the fine holes or transparent spots termed pinholes. Remedy, dilution and filtration, and strengthening of the solution by addition of silver, or by boiling up to proper strength.

TREATMENT OF THE THOROUGHLY WORN-OUT BATH.

After repeated partial renovations of the bath, as already described, it will, in time, from a combination of causes—as excess of alcohol and ether, of iodide and of organic matter—require a more thorough renovation. Proceed as follows:—

Pour the bath solution *into* one-fourth its volume of water, when it will immediately become “milky.” In this way it dissolves more iodide than by pouring even a greater amount of water into the bath solution, because the water is greatly in excess of the silver solution during the greater part of the mixing, and the bath is so greatly reduced at the outset that it cannot take up or re-dissolve much or any of the iodide. The bath added to the water is thoroughly filtered through two or three thicknesses of filtering paper. *Filter perfectly clear.*

It is to be borne in mind that the solution, which is now reduced to about twenty grains of silver to the ounce of water, is saturated with iodide, so that when the solution is raised in strength the percentage of iodide is reduced to the proper proportion.

Pour this clear solution into the evaporating dish, and heat it on the stove until it begins to steam. Test the solution for acid by placing in it a piece of blue litmus paper, which will turn red from the acidity of the bath. Pour in, drop by drop, a dilute solution of ammoniæ, one part to ten parts of water, stirring the solution the while that the ammoniæ may thoroughly mix, until the discoloured litmus paper resumes its bluish tint, but not beyond. The acid neutralized (by the ammoniæ), the solution, still boiling, grows black and muddy, and finally clears as the organic matter is precipitated, sticking to the bottom and sides of the dish ; the coagulated albumen rises as a thick metallic scum to the surface ; and the heat drives off the alcohol and ether.

When the solution is cold it must be filtered, and acidified, as already explained, with nitric acid. It must be borne in mind that *the nitric acid must not be added until the solution is perfectly cleared from organic matter by filtering*, because acid dissolves and holds the organic matter in solution ; while the alkaline liquids (in this case ammoniæ) favour precipitation. The addition of acid before filtering would undo a great part of the work of renovation you have been engaged in, by redissolving the organic matter.

If, after several treatments of the disordered bath in this manner, it fail, there remain two other methods—fusion and precipitation, and re-dissolution.

To Fuse the Bath.—Pour the bath into one-fourth its volume of water, and filter out the precipitated iodide ;

then, placing it in the evaporating dish on the stove evaporate to dryness *without adding ammonia or other neutralizing agent*, because upon adding ammonia, oxide of silver is thrown down, and if the bath were now evaporated to dryness, this powder, to which the name fulminating silver has been given, would be thrown down. This fulminate is of a most dangerously explosive character, even under water heated to 212° Fahr. When dry, a touch is sufficient to cause its violent decomposition.

When the solution approaches dryness it bubbles violently, and rises in the dish like soapsuds, until some of the bubbles burst, allowing the escape of vapour. Scrape the mass down into the middle of the dish, when the silver begins to liquefy again. When melted it remains quiet, without boiling or steaming, at the bottom of the dish. Insert a straw or splinter of wood, and continue the heat until it ignites, which shows that the organic matter is carbonized, and thus rendered perfectly insoluble. When cold, the fused mass may be dissolved in pure water by gentle heat. The organic matter is entirely separated, and will be left behind in the filter. It is now ready for use as a new bath.

To Restore by Precipitation.—Dilute and filter out the iodide, and pour the solution into large glass jars, half filling them, and add a little at a time, and continually agitating the solution the while, finely powdered bicarbonate of soda; this, uniting with the silver with violent effervescence, forms carbonate of silver, which, being insoluble in water, falls to the bottom of the jar. Now fill up the jar with pure water. When settled, pour off the water, fill up, and when settled again pour off, thus eight or ten times, to thoroughly wash the carbonate of silver; after the last washing drain off the water, and add, very cautiously, nitric acid, which will dissolve the carbonate

of silver with effervescence. Leave the least amount of carbonate of silver undissolved, or too much acid will be added, and the work have to be done again, the organic matter in the bath being dissolved if the silver is made acid. The least amount of precipitate of carbonate of silver undissolved leaves the bath alkaline. Now filter the muddy solution.

To Throw down Silver in a Metallic State.—Upon placing the solution in a clean evaporating dish with pieces of bright clean zinc, the silver will commence falling down in a metallic state, the zinc dissolving and taking the place of the silver. In a few hours the silver, in the form of a grey powder, will be all thrown down. Pick out the undissolved zinc, and scrape from it the silver clinging to it. Now add to the mixture a solution of sulphuric acid one part, water three parts, to dissolve any particles of zinc which may be left in the dish. Allow this to stand until no more bubbles of hydrogen gas are given off. Pour off the acid, and wash the silver in several changes of water until it no longer reddens litmus paper. The silver is now dissolved in nitric acid diluted with two parts of water, evaporated to dryness, and fused.

CHAPTER V.

COLLODION.

ALTHOUGH so many samples of commercial collodion are very excellent, and, perhaps, from the large quantities made up at one time, of more reliable and even quality than the operator can make up for himself, I think it certainly not a waste of time for him to learn how to make it for himself. Though I would advise the student to procure for his early use a good sample of commercial collodion, I yet think he ought to know of what it is composed, and the nature and properties of the several ingredients.

Collodion is made by dissolving pyroxyline or gun-cotton in a mixture of ether and alcohol. Pyroxyline is insoluble in water, alcohol, or ether, but with regard to the last-mentioned, many samples contain a percentage of alcohol; in these pyroxyline is sparingly soluble, but in alcohol and ether, of almost any proportion, it dissolves quite readily. A mixture of about equal parts is generally adopted in making collodion for ordinary use. Certain iodides and bromides are added to excite or sensitize the collodion, the iodides and bromides of ammonium, cadmium, and potassium being those most generally used—all, except potas-

sium, being readily soluble in collodion. Collodion may be "iodized" at the time it is made—that is, sensitized by the addition of the iodides and bromides according to the formula by which you are making it—or it may be kept "plain," to be iodized as you may require it.

Plain Collodion is made by adding ten or twelve* grains of pyroxylene to every ounce of alcohol, and when it is well soaked, adding an equal amount of ether. The cotton may not entirely dissolve, nor is this an evidence of a bad sample of cotton. When the collodion is settled perfectly clear it should be filtered through filtering-paper or cotton (it being advisable to cover the filter with a plate of glass, to prevent evaporation as much as possible), and preserved in a cool place.

The Iodides and Bromides used in the manufacture of collodion have various effects on it—those of an acid reaction, such as the iodide and bromide of cadmium, having the tendency to thicken and glutinize the collodion, and rather retarding its setting on the plate, but giving a depth and richness to the negative; while the alkaline iodides and bromides, as those of ammonium and potassium, have the opposite effect, as they tend to render the collodion, in time, more liquid, and, liberating free iodine, give the collodion a red colour, and destroy its sensitiveness; they, however, give the required intensity quickly, and cause the collodion to "set" rapidly.

THE SENSITIZED COLLODION

requires care, cleanliness, and some little intelligence in its preparation, together with the proper purity of the

* The quantity very much depends on the sample used, and no strict rule can be laid down.

chemicals used. The reader, if he has studied photographic literature to any extent, will have noticed that almost all writers differ in the proportions of the chemicals used in portrait collodion, and to a great extent in the iodides and bromides used; but a great number, if not a majority, seem to agree that a proportion of three grains of the bromides and five of the iodides to the ounce of collodion gives the best results.

I shall not, therefore, be giving anything new in the formula I subjoin, though I have a lurking fear that I shall be looked down upon that I do not produce something more startling. To disarm criticism on this point in some measure, I may say that it is rather my intention to endeavour to be of use to the reader by furnishing plain and reliable instruction, than to give him difficult and doubtful problems to solve:—

Alcohol and ether	...	...	5 ounces each.
Cotton,	6 grains to the ounce of alcohol and ether.		
Iodide of ammonium	...	...	25 grains.
Iodide of cadmium	...	...	25 "
Bromide of ammonium	...	...	16 "
Bromide of cadmium	...	...	16 "

Grind these in a mortar, adding the alcohol, and as they are dissolved pour the liquid into a bottle of sufficient size for the whole. There should be no residue, if it has been properly done.

The above are all readily dissolved in alcohol and ether, but where bromide of potassium is substituted for ammonium the operation of dissolving it is more difficult, potassium being very sparingly soluble in alcohol, and scarcely at all in ether; but by uniting it with iodide of cadmium the difficulty is at once overcome. Grind the

potassium fine in a dry state, and add to it, gradually, the iodide of cadmium until they are thoroughly incorporated; now moisten with alcohol until, evaporating, it leaves behind a snow-white paste. Continue to add alcohol, and grind, pouring off, after each addition, into the bottle until all is dissolved. When all the iodides and bromides are dissolved, the ether must be added a little at a time, the mixture being agitated after each addition of ether. When you have added all the ether, filter this mixture through filtering paper, through which it should run pure and clear. You can now add the cotton, tearing it up into little tufts. A little shaking will aid in the dissolution of the cotton. There may be a trifling sediment of cotton, but this does not greatly matter. When this has settled perfectly clear, as it should in a day or two, it will be improved by an addition of some old collodion of the same formula, and will continue to improve with age.

When this collodion is poured on the plate, it should flow perfectly smooth, and be quite transparent. The plate being well dusted, and carefully guarded from dust which may (but shouldn't) be flying, the film should be soft, and free from ridges or lumps; but as the ether evaporates, leaving the alcohol in excess, the collodion will show signs of glutinizing, setting on the plate in lumps and ridges. The remedy is to add ether in the manner already described, until these ridges cease to appear. Filter after the addition of ether in all cases.

The collodion, when first made, should be of a lemon colour: a dark red denotes too great acidity, and this may be neutralized by the addition of half a grain of bicarbonate of soda; but it were preferable, when it is too acid, to reject it, and seek purer chemicals.

In coating a glass plate with collodion, the residue

should be poured into a bottle kept for the purpose—*not back into that from which it was poured.*

All bottles holding collodion should be kept well stoppered, to prevent evaporation. To coat a plate, stopper the bottle, and take another to receive the surplus collodion from the plate, and that, without agitating the plate in hand, the young student will find no easy matter, but he will manage it with practice.

Do not get into a clumsy way of doing it at first.



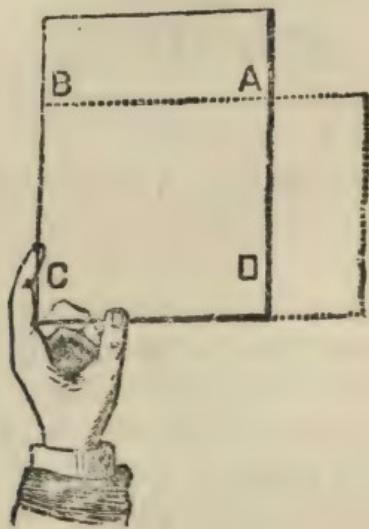
CHAPTER VI.

THE MANIPULATIONS IN THE DARK ROOM.

Coating the Plate with Collodion.—So many descriptions have been written of this operation, most of which seem to paraphrase Hamlet's instruction of Rosencrantz and Guildenstern in the art of playing on the pipe, that I am almost tempted to tell the reader to see it done by some experienced operator, *for that is almost necessary*. Practice alone will enable you to coat a plate with a perfectly clean and even film. The plate is held, resting on the edge of the first finger, and middle joint of the second finger underneath the plate, and the tip of the thumb over, as seen in the diagram. It would be well to practise holding the plate in this position firmly yet gently, before practising with the collodion bottle, until the hand gets steady. Do not get into a bad habit of holding the plate by bringing the whole of the fingers to aid you, or by spreading all the fingers into the centre of the under side of the plate, and the thumb over the corner, the result being that the warmth communicated by the tips of the fingers to the

plate causes the collodion to "set" on those points too rapidly, thereby spoiling the negative, and the thumb has done its share of mischief by coming in contact with the collodion, causing stains and breakage of the film.

Hold the surface perfectly horizontal when pouring on the collodion at point A, and continue till the collodion has reached the outer edge of the plate, then direct it by gently tilting to B, then by lowering the level of the



corner at C it will flow there, and letting it escape the tip of the thumb flow it to D corner, under which you should have the collodion bottle ready to catch the surplus. Without *very much* alteration of the horizontal position of the plate, it should be very gently rocked until the film is set; *i.e.*, when on touching its surface with the finger it receives an impression of it as in soft wax without tearing away. It is now ready to be immersed in the bath. It is very necessary to success that while enough collodion is poured on the plate, it shall not receive too much. Experience alone can enable you to determine this

The foregoing manipulation may be made in actinic or white light, but the next and subsequent manipulations must be conducted by the light of the (yellow glass) window, or shaded gaslight, to guard against the fogging of the plate. Therefore, shut the door of the dark room before you proceed to

The Immersion of the Collodionized Plate into the Silver Bath.—This operation is also a peculiar one, requiring care and steadiness. The plate is placed on the dip rod in the direction held in the previous manipulation, the edge B A, where the collodion is thinnest, resting on the prongs of the dipper. It will be noticed in the "set" film that one edge—that which the collodion first covered (which we will call the upper edge, it being uppermost when draining off the surplus collodion)—is thinner than that which it last reached, and was lowest when the surplus was drained off. Of consequence, the upper edge sets a little quicker than the lower, and is one of the reasons why it is immersed first.

The plate, properly resting on the dipper, is gently lowered, steadily and without hesitation, into the silver solution, and immediately it is submerged it is subjected to a gentle motion by a circular movement of the hand. When first immersed the alcohol and ether in the collodion film repel the water of the bath, and if the plate were now viewed it would be seen to have what is technically known as a "greasy" appearance, similar to a greasy plate on which water has been poured. The silver solution first clings to the plate in drops and patches, then in little rivers and streaks, and finally the whole of the collodion film becomes smooth and creamy; *after this point is reached allow the plate to remain in the bath a minute.*

Great care must be observed in immersing the plate, for if the plate has been immersed too soon after coating with

collodion, before it is properly set, the water in the bath precipitates the cotton of the collodion, and gives rise to a spotty appearance on the plate.

If, on the contrary, the plate has been held too long before putting it into the bath, the uneven evaporation of the collodion causes bluish patches in the film, which are insensitive to the action of light.

Too rapid an immersion causes streaks.

A plate arrested in its descent will be marked with a horizontal line indicating the surface of the bath solution at the moment of stoppage ; these are known as "hesitation lines."

When the plate is removed *too soon*, although it may have a smooth surface, the solution runs down in little rivulets, causing streaks by inequality of sensitiveness, which streaks become painfully manifest on development of the plate.

Being perfectly satisfied that the plate is sufficiently sensitized, it is held up on the edge of the bath to drain for a few moments, and then placed *in the carrier or holder*. This should be done as the plate was before placed on the dipper, the thin edge downwards, because the flow of the silver in withdrawing the plate has been that way, and to reverse it would cause a reflow of the silver over the surface of the plate, thereby causing streaks, and because, after exposure, the plate is taken out and held by the now upper and thick edge, that being the best to develop from, for reasons which will be explained when we come to consider the development of the plate.

The film at the time of placing the plate in the holder should be perfectly smooth, and of creamy semi-transparency, not at all bluish in colour.

After exposure in the camera, to which it is taken when the shutter of the holder is closed, it will be found to have

gained in density—*i. e.*, become more opaque, retaining its creamy colour—showing, it is thought, that decomposition has been going on after its withdrawal from the bath.

The plate should not be prepared any considerable time before it is required for exposure, otherwise insensitive patches mark the places where the film has dried, and metallic silver stains where the solution on the surface has been drawn from the lower edge (as in the carrier, by capillary attraction). Improperly carrying the carrier or holder a horizontal position causes the same markings, by allowing the silver solution to run over the plate.

Nothing definite can be said relative to the length of

EXPOSURE,

as that is entirely dependant on the amount of light and the nature of the subject, the state of the atmosphere and the time of day, &c. This subject will be treated more fully when we are under the “skylight,” and we may presume that having done our part in the dark room, the plate has been handed to the glass-house operator, and that it is properly timed in the exposure.

We now approach the most delicate and beautiful of the manipulations of the dark room—*developing*. Before we say anything on this subject, one or two words of warning are necessary as to the treatment of the carrier. It must be held or stood in a perpendicular or upright position from the time of the plate being placed in until it is taken out. The sensitive plate should not be kept a long time waiting for the arrangement of the sitter, as that should be done before the plate is withdrawn from the bath.

Two pictures should not be made on one plate, unless they are two of the same sitter in the same position with the same light and exposure, or unequal results will be the

consequence, as will be seen when we understand the development. It is impossible to get identically the same conditions in two or more pictures on one plate at different times, because the character of the plate is undergoing a continuous change; nor can you get the same conditions of light and exposure.

Keep the carrier clean. After each plate, wipe it out with a tuft of cotton or piece of rag, and keep the slide free from dust, as, on its withdrawal to make the exposure, the dust is set in motion to the detriment of the plate. Preserve the carrier from splashes of any of the solutions. Silver is a great enemy to the existence of the carrier, and to guard in some measure against its action on the wood and corners it should be frequently rubbed over on the inside with tallow; this, too, attracts and holds any stray particles of dust (which are sure otherwise to be set in motion on the withdrawal of the slide), as well as protecting the holder from the action of the silver from the plate. Place one or two thicknesses of blotting-paper on the back of the plate in the carrier, as this prevents a great deal of silver from running down.

CHAPTER VII.

THE DEVELOPER AND DEVELOPMENT.

WITH SOME SPECULATIONS ON THE NATURE OF THE INVISIBLE IMAGE
FORMED IN THE CAMERA.

DEVELOPMENT is one of the most beautiful of the photographic manipulations. It is performed in non-actinic light, as was the sensitizing of the plate, and the operator has been careful that his plate has not been exposed to actinic or white light, except in the camera, where it has undergone a change of the nature of which we cannot be said to have any exact knowledge. Looking at the plate, we can discover no perceptible alteration in the film; no image is visible; yet an image is latent, and the developer brings it out. On the skill and intelligence of the operator in this manipulation depends the success of all the work that has gone before—his to mar, and, to a certain extent, in some cases, to correct. That the reader may understand how important development is, and that he may bring to bear all his knowledge in the operation, let us consider the effect of the developing and fixing solutions on the unexposed and exposed films of collodion sensitized in the nitrate of silver bath.

Coat a glass plate with collodion, and sensitize in your negative bath. A coating of iodide and bromide of silver is formed on the surface, and the plate is moistened with nitrate of silver. If (this operation having been performed in a room, as your dark room should be, free from actinic light) you now float the plate with a solution of sulphate of iron in water (the developer), you can observe the silver in a metallic state floating about on the surface of the plate. By washing the plate under the tap, all the "free silver," as it is termed, will be washed off. Place it immediately in a solution of cyanide of potassium or hyposulphite of soda, and the surface of the plate will be left very much in the state it was when the collodion was poured on.

Sensitize another plate, and before pouring on the solution of iron in water, expose the plate to the actinic rays for a few seconds. Bringing back the plate to the dark room, we can perceive no change in the film, yet a remarkable change has taken place; for, on applying the developer, we perceive that, although the silver is reduced, as on the other plate, instead of its floating about the plate as before, a portion of it is attracted to the film and is deposited there, and the plate is seen to darken and grow opaque. Only a portion of the silver, too, can be washed off under the tap; and the plate being placed in the solution of hyposulphite of soda (which has not the property of dissolving metallic silver), it remains unaffected.

Once more taking a sensitized plate and putting it in the carrier, by half opening the slide we expose one-half of the plate. Now, on developing, we find one-half (that exposed) darkens by the attraction of metallic silver to its surface, while on the other the silver floats about in a free state. Washed and placed in the hyposulphite of soda solution, the exposed half will be found to have an opaque

film, as the plate of the second experiment; while that half of the plate unaffected by actinic light will have an appearance much as it had when first flowed with collodion, and like the plate of our first experiment.

By this it will be seen that, all the conditions being identical, actinic light must have worked this marvellous change; and on this, it may be said, is photography based.

When the plate is first exposed in the camera, it receives, by the action of the actinic rays, an impression on its surface; and the developer discloses this, the reduced silver being attracted to those parts affected by the light. There is now remaining on the parts of the negative unaffected by light, iodide of silver; and unless this is dissolved and removed, the image is in danger of being obliterated by the action of light; and the shadows being rendered opaque, the passage of light in printing is prevented. This dissolution of the iodide of silver in the solution of hyposulphite of soda or cyanide of potassium is termed "fixing" the image; after which it is well washed under the tap.

It has been seen that the action of light on the sensitized plate has caused no perceptible change in its appearance, nor can any be detected by the aid of the most powerful magnifying glass. That a change of some kind has been effected is proved by our experiments, and the fact has been established that the impression is not of a temporary character, plates having been developed months after exposure, and with perfect success, provided always that the plates have been protected from actinic light in the interval.

What, then, is the nature of the invisible image? All that is advanced on the subject is a matter of conjecture. These theories may be briefly given:—(1.) That during the exposure of the plate, a reduction of a small part of the iodide to the metallic state accelerates and directs the sub-

sequent reduction caused by the iron developer. (2.) The reduced silver forming the image under the action of light in the camera is produced instantaneously, and the free acid of the nitrate of silver solution in the film tends to weaken and destroy it. We know that if we expose the plate in the camera for a considerable time (say an hour) before a brilliantly lighted object, a faint visible image is impressed on the plate without application of the developer; therefore it is assumed the change of the silver salt under the action of light is to a metallic state. (3.) A molecular change of the silver, unattended by separation of the elements, such as occurs in the case of a visible image impressed by light, is supposed to be the character of the formation of the invisible image; yet such a modification of the film has taken place as to predispose it for the reception of silver when reduced by the action of the developer to a metallic state.

THE DEVELOPING SOLUTION.

In developing the invisible image, the agents generally employed are protosulphate of iron, the double sulphate of iron and ammoniæ, and pyrogallic acid. If a solution of sulphate of iron and water be poured on a plate sensitized with nitrate of silver, the reduction is immediate, and to retard this action an acid is added. The rapidity of action of the developer is also affected by the temperature of the atmosphere and the developing solution—the reduction of the silver being slower at a very cold than at a very warm temperature. In portrait photography protosulphate of iron and the double sulphate of iron and ammoniæ are used for developing, universally, of strength varying according to circumstances. The usual strength is,—

Protosulphate of iron ..	...	1 ounce.
Glacial acetic acid ..	...	1 ,
Water ...	...	16 ounces.

This solution, after a day or two, turns yellow, and deepens in colour as it is kept, and a sediment falls to the bottom of the bottle; this can be easily filtered out. It does not appear to affect the chemical action of the developer, and though many prefer a new solution, I have failed to discover any difference.

After dipping many plates in the negative bath, it accumulates alcohol and ether from the collodion, which prevents the developer from flowing evenly over the plate, in which case a little alcohol added to the developer is sufficient to overcome the difficulty; but it is better to renovate the bath in the manner already described.

The effect of a strong developer is to reduce intensity, making the image appear thin, and lacking sufficient contrast; while a too weak developer brings the image out slowly and too intensely in the high lights, leaving the shadows comparatively bare. Another effect of a developer of this character is, that the reduction set in motion by it is so slow that the shadows become fogged before the lights are sufficiently brought out; and the same effect is caused by a strong developer, because the reduction of silver is too rapid to be properly watched, so that, before the developer can be washed off, the silver has been deposited on all parts of the negative, giving the shadows a misty, veiled appearance.

DEVELOPMENT.

The flow of developer over the plate must be rapid and steady, poured on from the thick edge of the film, that uppermost in the carrier (see Chapter VI.) The plate is

held as explained in the manipulation of coating with collodion. Just enough developer being poured on to cover the plate with a steady flow, none should be permitted to run off. In a moment or two after the application of the developer the image will begin to appear. Allow the solution to remain on the plate until the high lights are nearly out, and before the deepest shadows have any delineation, as development goes on to a certain extent while the developer is being washed off.

The timing of the exposure being correct, and the lighting of the sitter being perfect, the image on the plate should come up under development in a few moments after covering the plate with developer, and continue to grow to its proper intensity without any of the agonized gymnastics so often indulged in by operators in this manipulation, and so painful to behold. The plate should be held perfectly still and level, that none of the silver be lost from its surface. Sometimes when lighting and timing (by which is expressed the time of exposure of the plate) are not quite right, a little gentle motion may aid the development.

The effect of an under-exposure of the negative is, that the silver precipitated by the sulphate of iron does not deposit on the plate sufficiently to form a perfect image, the brightest lights alone receiving it, and the delicate lights and half-tones being perfectly void.

In an over-exposed plate, the proper gradation is lost by extending the deposit to the shadows. So, too, with the development: if the iron solution and silver be washed off too soon, much the same effect as in an under-timed negative is seen; and over-development will make the most brilliant negative flat and uninteresting.

Quickness of eye, deftness of hand, and care are more necessary in this manipulation, perhaps, than in any other

in the whole range of photography. There is here endless variety ; changes of lighting necessary to suit the style, dress, or whim of the sitter ; slight differences of exposure, and the manipulation of drapery, from funereal black to dazzling bridal white, all coming within the range of one day's experience, and all to be treated differently, and often (as in the case of the operator whose province is the dark room) only discovered as he develops the plate. He has to bring all his experience to bear on the instant.



CHAPTER VIII.

REDEVELOPMENT AND INTENSIFICATION—THE FIXING SOLUTIONS—VARNISHING.

Redevelopment and Intensification are corrective measures; properly lighted, exposed, and developed, the negative should not require either of these manipulations to produce the required effect. The difference between the two methods may be thus described. Redevelopment is a second application of developer, or a solution of pyrogallic acid and silver, before the negative is fixed, for the purpose of bringing out further detail, which the development has failed to do ; while intensifying or "strengthening" is the application of the pyrogallic acid solution and silver to any extent, after fixing the negative, tending only to strengthen the image already formed on the plate, and having no effect in bringing out any further detail.

As I have said before, these methods shbuld not be resorted to unless, from some cause, you are unable to get sufficient time of exposure on the plate, as in the case of a child or nervous sitter, or from the weakness of the light. With your bath and collodion in proper working order the negative should grow under development to a perfect density.

If your negatives come up uniformly weak and thin, and you know the lighting is good, and have confidence in your sensitizing solution, weaken the developer a little with water, adding a drop or two of acid.

In the case of a negative being too thin or weak—that is, lacking sufficient contrast between the lights and shadows—it may be strengthened in various ways, either before or after it is "fixed."

If it is found necessary to strengthen before fixing, the negative should be thoroughly washed, and flowed with a small quantity of a solution of

Pyrogallic acid	...	...	...	40 grains.
Citric acid...	...	...	...	40 ,
Water	...	...	...	30 ounces.

Pour a little of this solution into a small glass or graduated measure similar to that used for the development; pour the solution over the plate two or three times, covering it in every part, draining it back into the glass, not to waste it; to this add a few drops of a 20-grain solution of silver (in water), and with this flow the plate until the desired density is gained, or the solution turns "muddy." If it arrive at that state before you have accomplished your purpose, wash the negative again thoroughly, and repeat the application, first the pyrogallic acid solution, then with the silver added. The reason for first wetting the film with the acid is that thereby stains, which would be sure to appear if the silver were first poured over it, are avoided.

If, after fixing, it is found necessary to intensify the negative, great care must be taken to thoroughly wash off the hyposulphite of soda, as its presence causes bluish stains and streaks. This carefully done, proceed to

strengthen with pyrogallic acid and silver, using the precautions before described against streaks. This operation of strengthening after fixing the negative has the tendency to change the colour of the film to a bluish hue, but the colour better adapted to printing purposes, of an olive brown, may be restored by placing the negative again in the hyposulphite of soda solution after thoroughly washing off the intensifier. Thoroughly wash away all traces of hyposulphite of soda.

While the process of redevelopment or strengthening before fixation of the negative must be conducted in non-actinic light, and before the negative has been so exposed after development, because actinic light has still an influence on the iodide of silver, it is not absolutely necessary with the intensification of the fixed image, a weak diffused light not affecting the deposit of silver.

Where the negative is of a subject white and black, as with copies of engravings, printed matter, manuscripts, &c., sulphuret of potassium or bichloride of mercury and ammoniæ are used as intensifying agents. Permanganate of potassium, tincture of iodine, &c., are also sometimes used as intensifiers.

To Strengthen with Sulphuret of Potassium.—Strengthen the negative before fixing, as before described with pyrogallic acid; fix and wash the negative thoroughly. This will not be sufficient, as you want the whites of the negative perfectly opaque. Take in your developing glass a piece of sulphuret of potassium of the size of a common marble, filling the glass with water; and, without waiting for it to dissolve, flow it over the plate; continue this, the solution gaining strength as the sulphuret dissolves. The plate will now gradually assume a purplish black hue until the required intensity is gained. The reason why the sulphuret is not allowed to fully dissolve before beginning

the intensification is, that its action would be too rapid to allow the operator to flow the plate without causing streaks and stains.

The objections to the use of sulphuret of potassium are such as almost to nullify its virtues as an agent for intensification. In the first place, negatives strengthened by it cannot be kept in a state of preservation long, owing to the decomposition of the sulphuret of silver which is formed in the film; secondly, it can only be prepared in solution at the very moment of use; and thirdly, the smell of sulphuret of potassium is so offensive that some operators cannot use it at all. Rather grave objections, you will say. They certainly are; but still the sulphuret is at times very useful as a rapid and sure intensifier.

To Intensify with Bichloride of Mercury and Ammonia.—Strengthen the negative with pyrogallic acid and silver as before described, wash, and fix, and again subject it to a thorough washing. Now pour over the plate a saturated solution of mercury in water, diluted in 6 parts of water. (When a liquid has dissolved as much of a solid as it is capable of doing, it is termed a saturated solution. Therefore you will understand by a saturated solution of bichloride of mercury that the water in which the bichloride of mercury was dissolved has taken up as much as it was capable of doing.) Continue to pour this solution on and off the plate till the image, first turning to a greyish colour, gradually grows lighter until it becomes nearly white. Wash the plate, and flow on a weak solution of ammonia 1 part and water 8 parts. Gradually and cautiously increase the strength of this solution by adding ammonia. The plate will now darken until it grows perfectly opaque and black.

THE FIXING SOLUTIONS.

For fixing negatives either cyanide of potassium or hyposulphite of soda may be used; but for several reasons the latter is to be preferred. Cyanide of potassium is highly poisonous, and, entering the system either through wounds on the hands and the pores of the skin, or its fumes being inhaled, its effect on some constitutions is indeed terrible. When used as a fixing agent, dissolve one ounce of cyanide of potassium in six of water, and it may be used until its strength is exhausted.

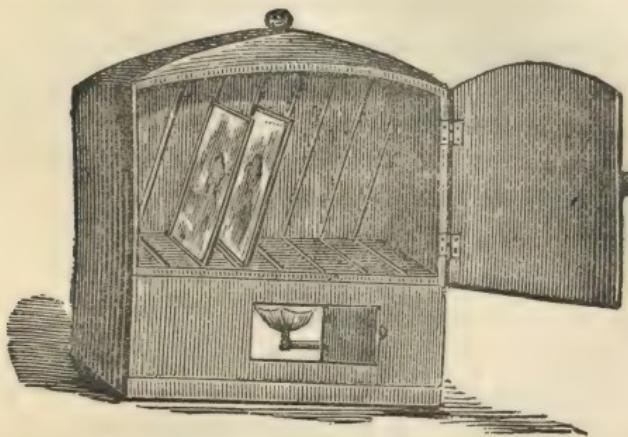
Make a saturated solution of hyposulphite of soda. A flat dish or tray in which two or four negatives can lie side by side is to be preferred to the dipping bath sometimes used, as you can leave the negatives in the solution for a long time without hurt, and it may not be always convenient to watch the negative until it is fixed. This solution should be constantly changed—that is, every day, or two or three days, according to the amount of work done—as it after a time becomes saturated with iodide of silver, and deposits crystals of iodide on the negative, causing pinholes precisely similar to those caused by the bath when overcharged with iodide. The old fixing solutions may be preserved for reduction in a barrel, and the silver is thrown down as sulphide of silver with sulphuret of potassium.

VARNISHING THE NEGATIVE.

After fixing the negative, it is thoroughly washed and dried, and is now ready for varnishing. Here too much care cannot be exercised, as many negatives are ruined in this operation by carelessness.

A good varnish will dry, giving a surface perfectly smooth and hard, and will not present a "dead" appear-

ance. The negative, before varnishing, should be warmed to a gentle heat, and for this purpose a little tin oven is used, fitted with grooves at an angle of 30° , in which the plates can stand safely side by side about an inch apart.



Under a false floor a gas jet may be inserted to keep the stove at a uniform and gentle heat. When the negative has been perfectly dried, and is warm—not hot—to the touch, pour over it the varnish in the manner described when the plate was coated with collodion, allowing the varnish to soak into the film for a few moments before the residue is poured back into the bottle. This should not be the pouring bottle, but one kept handy with a filter, in which the surplus varnish is caught. This surplus is thus filtered at once, and when full the bottle may be used as the pouring bottle, while the other holds the filter. In this way dust and dirt are not carried back into the bottle from which you pour the varnish. Rock the plate gently after the surplus varnish is flowed off, to prevent the film setting in ridges. Now return the plate to the oven, and when dry the varnish should present a smooth, hard, and glossy surface.

Should the varnished surface present a dead appearance when dry, it shows that the plate was not sufficiently warmed before applying the varnish, or that it was chilled during the operation. In this case it should be heated to the proper temperature, and revarnished more carefully. If through inadvertance the negative has been varnished before it is perfectly dried, a stain will mark the presence of the dampness of the film under the varnish ; a second varnishing, first subjecting the plate to heat, may remedy it, but great care should be exercised to guard against dampness and dust spoiling the negative at this stage, for failure is easy, and an accident is almost irremediable except by the exercise of great skill, and certainly at the expense of much wasted time.

An alcohol varnish film may be removed by pouring alcohol on and off the surface. Take in a glass a small quantity of alcohol, and evenly flow the film (this will moisten the varnish) ; then continue to pour alcohol on and off, catching it, as it runs off, in the pouring glass ; the varnish film will dissolve and run off with the alcohol ; but this should not be resorted to except in extreme cases, as the negative is liable to become stained.

When by evaporation of the alcohol it becomes too thick, the addition of alcohol will be needed.

A varnish showing tendency to dissolve the collodion film evidences the presence of ether in its composition, and should at once be cast aside.

Much of the beauty of the negative, and more of its usefulness as a printing cliché, depend on the varnishing.

I have abstained from giving the reader a formula for varnish, as I am of opinion that, from the difficulties to be encountered in its manufacture, he had better purchase one of the many good commercial samples.

PART II.

ART PHOTOGRAPHY.

CHAPTER IX

THE GLASS HOUSE.

HAVING studied the dark room work, we will step forth into the glass house and study the manipulations which have hitherto been merely alluded to—lighting, posing, exposure of the plate, &c.

Our attention is first directed to the dimensions and build of the glazed roof and side through which the light passes to illuminate our sitters. The build of the skylight is of very great importance, but we are often compelled by circumstances to some modification of our plans by the space at our command and the plan of the house on which we propose to build our skylight. Again, many have to take the skylight as they find it, with all its defects and imperfections; but here, if a ready ingenuity is brought to bear on the subject, is scope for management that will tend to make even a bad light a passable one by a judicious arrangement of screens and reflectors.

As it is quite impossible to explain all the plans on which skylights have been built, point out their faults, and suggest remedial alterations and modifications, I shall confine myself to a description of the best and handiest form of skylight.

Our object is to produce light and shade, and the skylight which most readily produces this with all the beautiful gradations between high light and the deepest shadow, it is our aim to secure. If the light be projected on the sitter from one point the contrasts are too severe, and gradation is entirely lost; while two lights of equal strength from opposite directions would destroy all contrast, and produce a flat and unnatural effect. The light we require must be soft and diffused.

The direct rays of the sun must, it is obvious, be avoided, so that our first care is to secure an aspect on which the sun's rays linger least. On a skylight of eastern aspect the sun shines in the morning, and a western light receives the afternoon rays, while into the skylight of southerly aspect the sun streams both before and after noon: the north alone is free from this objection, hence that aspect is obviously the one to be selected for our skylight.

It is to be borne in mind that one skylight will not suit all classes of work equally well, for, whilst a low light, speaking generally, is better adapted to the illumination of standing figures, giving brilliancy to all parts of the picture, a light of higher build is more adapted to the head and bust style of portraiture, so that it is essential so to construct the light as to adapt it for the production of general work.

The side and top light combined is the favourite form of skylight, though I am of opinion that for portraiture a sloping side light presents more advantages, with fewer dis-

advantages, especially where the practice is confined to head and bust portraiture.

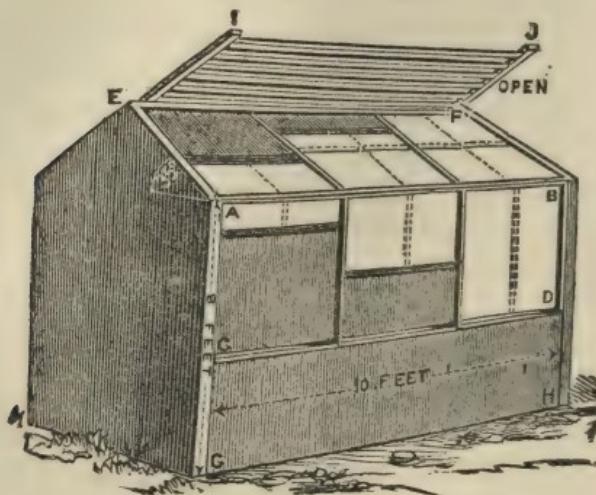
The gallery should *not be less than ten feet long*, which will represent the length of the sidelight (more than that is unnecessary), and the extreme height (say) twelve feet. If greater length can be obtained, there should be at each end of the glass house an unglazed portion of three or four feet—but this is not obtainable in one of the small dimensions I have here given; with this altitude of twelve feet, a side light sloping inwards from a point three feet from the floor to another four feet in the roof will give ample top light for most purposes of photographic portraiture. The three feet below the light should be boarded up. Movable spring curtains that admit of shading portions of the light, either top or bottom, render this light particularly manageable for all styles of illumination of the head and bust.

For the combination top and side light, let the side window of the length given above—ten feet—rise to a height of eight feet of the floor, giving five feet in height of glass (the lower three feet being boarded up, as described above); from the top of the side light the top light rises at an angle of thirty-five degrees to the ceiling, the rest of which is covered in.

The cut given on the following page will explain the arrangement of the lights:—

A, B, C, D represent the dimensions of the side light, five feet high by ten feet in length; A, B, G, H being the entire side of the structure, including the three feet boarded up below the light. E, F, A, B is the top light, having a "pitch" of thirty-five degrees. This is designed to permit of the rain readily running off. At certain seasons of the year, when the sun attains a high elevation, its rays may intrude through the top light, and to prevent this to a

certain extent, the poles E, I, and F, J, are built, on which are fitted movable slats resembling Venetian blinds, under



control from within the skylight. As a substitute, a canvas may be fitted with rings running on the poles, which canvas may be hoisted or let down at pleasure from within by means of ropes. This canvas has several disadvantages, not the least being that, like a sail, it may be carried away in a high wind, leaving you under "bare poles," or carry away the support with it.

To guard against leakage—for the most carefully built skylight will leak—the sashes of the top light should be fitted inside with narrow gutters from the ridge of the top light into a common gutter running along the top of the side light. A little outlay in this will save you much in carpets, furniture, and instruments.

The glass of the lights should be of good quality, perfectly white, as on that the purity and strength of illumination depend; and the panes should be as large as practicable, that you may not lose light by a multiplication of sashes, and to have as few over-lapping edges as possible.

These lappings should be about one-sixth or one-fourth of an inch.

Ventilation should be provided for: one or two sashes in the side light may be fitted to open either on a pivot or on hinges.

Screens and Blinds.—Now we have the light, our next care is to be able to cut it off at pleasure. It will be found in portrait photography that the varying types of countenance to be treated by the portraitist demand different illumination as well as arrangement of pose; and to be able to carry out the plan formed in the mind for the illumination of a particular face, we must have the light thoroughly under control.

Some men there are, unfortunately for photography, who have no idea of the effect of light and shade, to whom the best arrangements of blinds are merely obstructive; but to the artist they are as necessary as brushes and colour to his brother of the brush.

The methods of shading and cutting off the light are very various, almost every individual worker having some plan of his own, either from choice, or the necessity forced upon him by the peculiarities in the build of his skylight. I think the very best plan I have known is to provide three shades on spring rollers, whose combined width covers the entire area of the top light. The rollers are fitted to the top ridge of the light (inside, of course), with a little wheel over which the string runs fixed at the *top of the side light*, governing it. These runners are fitted with a self-acting catch, doing away with the necessity of tying the string communicating with the blind to keep it in place. The blinds of the top light are fitted so as to pull *down*; those of the side light should pull *up*, the roller of the blind being fixed to the bottom of the side light, and the string running over the little wheel at the top; so that

when both shades are in use *the light is not divided*. Too often we see this blunder, which a very little consideration would have avoided.

The floor of the skylight should be very even and steady; and, to present a pleasant appearance to the eye, should be covered in some way, either with oilcloth, carpet, or matting, unless an inlaid floor is put down. At first sight this appears to be a very expensive proceeding, but as being very durable, and the very best thing you can have, it is not so in the long run, as it wears many years, and outlasts carpets and oilcloths, and always looks well. Oilcloth is, perhaps, the next best thing, with a carpet for the portion of the gallery on which the sitter is posed. This is a necessity where full-length portraits are made.

Pictures pleasantly adorn the walls of the skylight, and aid very much to do away with that painful hopeless feeling sitters appear to experience in our ateliers. A little adornment and brightening would tend to do away with the necessity for the oft-repeated injunction to the sitter to "try and look a little more cheerful."

CHAPTER X.

THE GLASS HOUSE FURNITURE AND ACCESSORIES.

As I said in the last chapter, let a little tasteful adornment make the glass house cheerful and pleasant to the eye ; nor need there be any extravagance to accomplish this. The walls and unglazed portion of the roof may be painted in one of the many greys which are so very pretty, avoiding a tint, of course, which casts troublesome reflections. A simple decorative bordering, while adding little to the expense, gives a finish and beauty it should be our object to secure.

Many object to painting the walls on account of the outlay, but supposing it is our object to *keep our studio clean and bright-looking*, it is by far cheaper in the long run than paper, as it not only wears better, but may be cleaned, and has in itself more elements of beauty than even expensive wall-paper.

Pictures for the walls are a great adornment, but, in advising their introduction, there arise several objections : they are not absolutely necessary, and good pictures have a value which sets them beyond the reach of all but the rich, and it is so easy to mar the most handsome room with rubbish. If you have pictures at all, let them be examples of art it will be edifying to you to study. Engravings of the studies of good masters are perhaps the safest and wisest purchases you can make, and I am of opinion their influence in your gallery will not be thrown away. Then,

in specimens of your own work in tasteful display you can do a great deal to relieve the monotony of bare walls.

A frame of specimens of the different styles of pictures made is very useful to assist the sitter in his choice when undecided.

BACKGROUNDS

are of great variety—some in good taste—others (*most*) quite the reverse. In a portrait, though the head is of first consideration, the background should have some thought bestowed on it, and a plain, uniform background is the very worst you can have.

A carefully graduated background is one of the most useful you can select, so that you can secure relief and contrast to the figure.

A background painted to represent the effect of light falling on a grey cone is one of the best forms of ground for head and bust portraiture, the lighted portions of the figure being in contrast with the darker shade of the ground behind, and the shadow side being relieved by the lighter shade of the background. This style of background is a very good substitute for the cone itself (having the advantage, too, of being lighter and more portable), though the cone admits of more variety of illumination. For the benefit of those who have not seen or read any description of the conical background, I will explain its construction.

The Conical Background.—A circular piece of zinc, cardboard, or other material, of five or six feet in diameter, is slit to the centre; by overlapping the edges of the cut, the centre of the circle is thrown back, and the outside of the circle is contracted in size, but retaining its circular shape, assumes the conical form. Fixed in this form it is mounted on a head-rest base, in which it may be moved up and down as required.

The effect, when placed behind a sitter, is to produce shadow on the conical background, where the light strikes the sitter, and vice versa. The explanation of this may be understood in a moment, the edge of background nearest the light casting a delicate shadow, of more perfect gradation than the most cunning brush can produce, and the opposite side of the background, that farthest from the light, and behind the shaded side of the sitter, is illuminated by the rays of light falling on its surface.

Scenic backgrounds are generally to be avoided as a dangerous experiment, except where they are the work of an artist, and used by an artist. They should always be suggestive, rather than the sharply-defined and thoroughly unnatural backgrounds too often seen in photographs. For an interior, the effect of light shining through a casement half hidden by a projection, or piece of massive furniture in shadow, may give variety, which will prove agreeable; but be careful that the natural light falls on the sitter in the same direction as that pictured on the background.

ACCESSORIES.

In the introduction of accessories there is scope for great artistic taste.

For exteriors, rocks, stumps, shrubbery, gateways, &c., may be introduced with good effect, with a background suggestive of the open air. One of the great dangers of the introduction of accessories is over-doing it, bringing together a lot of incongruous objects, a fault which must be avoided at any risk.

For interiors there is greater variety—and greater danger of overcrowding—chairs, tables, statuettes, pictures, curtains, hassocks, &c., will be found effective if judiciously introduced.

The posing chair, or high-backed chair, for standing figures, is a very useful accessory, but one generally abused, for, as a rule, where it becomes an adjunct of the gallery, it thenceforward enters into all the pictures. In using it, let the pose be made that the figure rests on it, not leans, whereby a stoop is introduced, and the lines of the drapery are destroyed.

The curtain of silk or repp is also a graceful accessory when not used too often. By it many beautiful lines are introduced into the picture, and it is often of great use in hiding and breaking up ugly lines, and for hiding the lower portion of the rest.

THE POSING PLATFORM

is very valuable, as by it a sitter can be moved to adjust the illumination without being disturbed. It is a structure resembling a table-top on castors, on which the sitter's chair is placed, with two upright handles by which the platform can be wheeled to any part of the gallery without disturbing the sitter. Nothing is so annoying to sitter and operator alike as that every trifling change necessitates disturbing the subject. A favourable and easy pose is often lost, because a change of position is necessary for a better illumination, and the trouble and fear of annoying the sitter often excuse the operator seeking to secure a better light by a movement of the posing chair; whilst the adoption of the platform would obviate all the annoyance, and much of the operator's labour.

SCREENS AND REFLECTORS.

The light may be modified and directed, to a very considerable extent, by the aid of screens and reflectors, and by their judicious use an awkward light can to a great extent be controlled. Even the painfully unnatural effects produced by the top light and the side light may be obviated.

With the top light alone, the effect is to exaggerate the projections of the brows, cheek bones, and nose, and to give the eyes a sunken and deep-set appearance, by the heavy shadows cast by those projections. Here a screen of one or two thicknesses of tissue paper fixed over the head of the sitter tends to reduce the severity of the down-pour of light, while reflectors are placed at such an angle as to reflect light into the dark shadows, care being taken not to entirely destroy them, or to produce false lights.

The side light produces a "hatchet" expression, the face assuming a wedge-shaped appearance, in consequence of the light, strong from one source and lacking diffusion, striking that side of the face nearest it, and causing a sharp shadow on the other side, gives a flat appearance to both. Here a reflector above the sitter, placed at an angle to catch the light, reflects it down on the sitter, and causes the diffusion of rays we get in the combined top and side light. Reflectors on the shadow side aid in the modelling of the face. In these extreme cases I have roughly sketched the uses of screens and reflectors, but even with the best working light they are great aids to the artist.

By lighting-up dark shadows, reflectors give roundness and modulation to the face; but the effect should be carefully watched, that too much light is not reflected, whereby the shadows are cut up and destroyed.

The best form of reflector is a light frame on which is stretched white calico or paper, set on centre-pivots, in an upright movable stand, so that the reflector will move to any required angle.

Screens may be of the same form, tissue paper being substituted for the opaque calico or paper. One of tissue paper, stretched on a hoop or light frame for shading the top of the head from too strong top light, should also be provided.

CHAPTER XI.

THE PHOTOGRAPHER'S TOOLS—COPYING.

IN the choice of cameras, lenses, head-rests, and other requisites of the photographer, the best are always the cheapest. To buy a lens because it is *cheap* is a great mistake, and sure in the end to lead to needless expense and annoyance.

The Camera.—The body of the camera should be of the best quality procurable, and it will outlast two or three of inferior make, besides being free from the defects of construction which are so often a source of anxiety and failure.

The swing back, both vertical and horizontal, should be one of its features; as also a sliding carriage for the plate-holder. The rigid and obstinate old "box" should be banished absolutely. This specimen of antique ingenuity, with its ground glass always in the way of the plate-holder—each endeavour to insert the plate-holder developing into a struggle that shakes the camera out of position—its springs to keep the ground glass in its place growing limp and useless, that the focus is always untrue; surely such a camera should be abandoned as soon as possible, and ought never to be adopted when one of better construction can be obtained.

A camera superior in every respect is that with the ground glass fixed on hinges to swing back when the plate-carrier is inserted in the sliding-carriage. The bellows construction in place of the wooden "box" lightens the camera considerably, and makes it easier in the focussing movement. The swing back is for the adjustment of the plane of the ground glass (and, of consequence, the surface of the plate in the carrier) to that of the image, an arrangement the advantages of which will commend themselves at once to my readers.

The Camera Stand should possess the qualities of steadiness, lightness, movability, and ease of adjustment, qualities few really do possess. The stand answering more nearly to this description is, I believe, of American manufacture; in form, like a small oblong kitchen table, the top of which can be adjusted by simple levers to angles that elevate or depress the lens as may be necessary. This stand presents a solid rest for the camera, admits of great scope of movement without hard and disagreeable work with screws that are always getting clogged or rusty, and is easily moved about the gallery, being fitted with castors.

Lenses should not be purchased by the inexperienced, and few, even among experienced operators, know enough about them to be able to make a wise selection without trial in the camera.

If, on placing the lens on a piece of pure white paper, its colour as seen through the lens appears changed to a yellowish or greenish tint, it is to be borne in mind that in proportion to the depth of tint the lens will lack in the actinic power required in photography, though the lens may be most admirable in every other respect. It will be "slow working," a property quite fatal to its use in portraiture.

Adjusting the Focus.--It sometimes happens that the focus on the ground glass is not a true one ; to test this, and ascertain whether it is forward or back of the plane of the ground glass, place a piece of printed paper in front of the lens in an inclined position, towards and from the lens, and, focussing sharply in the centre of the paper, make a negative. The letters focussed should, of course, be "sharpest" in the negative ; but should the ground glass be out of position, the letters nearer to or further from the centre are in better focus than those focussed on the ground glass, which must be moved back or forward, as the case may be.

Cleaning the Lenses.--Care must be taken not to scratch the surfaces of the lenses in cleaning them (*paper should never be used*), as the delicate polish of the surface is easily injured. A piece of soft rag is the best thing for polishing, the breath giving sufficient moisture to remove dirt ; after which polishing, a camel's hair brush may be used to dust off the surface.

In removing the lenses of a portrait combination, there is a risk of reversing them in the replacing, and this is an extremely awkward accident in its results. The front lens, or that nearest the sitter, is a cemented achromatic, and must be mounted with its convex side outwards. With the back lens, place the cell on the table, and drop in the double convex lens ; the ring which separates the lenses is next placed in position, and then the other glass, with its concave side next the lens already in place.

The lens must be chosen to suit the size of picture for which it is required : a card lens will not be suitable for a large head, and one adapted for large work will, for a carte-de-visite figure, require a long distance between it and the figure, possible only in a large gallery.

For groups, a lens of long focus is the best, as it thereby

gives greater depth of focus—*i.e.*, the line of sharpness is broader; objects back and front of the plane on which the focus is made appear sharp and distinct—an immense advantage where it is not always possible or desirable to place all the figures of the group in a line.

Diaphragms or Stops.—The image formed by the portrait lens having a curvature of field, or coming to a focus at unequal distances from the plane of the ground glass, causes those portions of the image farthest from the centre to be out of focus, unless the focus has been fixed on any point away from the centre, when the other parts are thrown out. This is caused by the form of the lens, though the defect is reduced to a minimum in the portrait combination. To correct this, in a measure, stops, or little slips of sheet metal with a hole in the centre, are inserted between the lenses, the effect of which is to stop out or prevent the action of certain rays—those farthest from the centre of the lens. The smaller the aperture of the stop, the sharper the entire image becomes, but it is at the expense of light, and consequently rapidity of working.

Head-rests should be firm, but not too heavy to be moved readily about the gallery.

THE COPYING STAND.

In copying pictures, especially prints, plans, &c., great exactness is necessary, and to secure this a well-made stand is requisite. Too often very make-shift arrangements satisfy the photographer, and in consequence many failures result. The best form for a copying stand is a long narrow table, fitted at one end with a stout upright bar, at a perfect right angle with the table; on this is fitted a flat square board, which may be moved up and down at pleasure, and is fixed with a spring or screw. By this means the picture is always perfectly on the plane of the camera, if it is

properly on the table. To regulate this, two little ridges of wood are fixed to the surface of the table, running its entire length, separated, the distance corresponding to the width of your copying camera; and between these two ridges the camera is kept in position, so that the picture to be copied must come precisely in the centre, and also stand perfectly true as regards the camera. The table may be fitted with castors, that it may be easily moved, and with a long exposure and changing light, movement during the exposure is, with the observance of great care, possible.

Another useful form of copying stand may be fitted to the camera stand, if of the kind I have described. It is formed of two strong and fine bars of wood running in grooves one on each side of the camera stand, and joined in front. In the front piece, the upright and board may be fitted in a moment by means of a screw. When not in use, these bars fit close to the front and side of the camera stand, and when required for copying they are pushed out to the required focussing distance.

COPYING.

Collodion.—A rather old and reddish collodion is the best for copying; it is slow in working, but shortness of exposure is not so much an object as in portraiture.

Daguerreotypes are best copied under two strong lights, which may in most cases be cast on it by means of mirrors on opposite sides of the picture; in this way are the shadows caused by scratches in the silver plate destroyed. Sometimes, where the Daguerreotype is stained, it may be found necessary to clean it. This can be done by first dipping it in clean water, to evenly wet the surface. Then place a small piece of cyanide of potassium in water in a

graduated measure. Flow this on and off the plate while the cyanide is dissolving, and until the plate becomes as clean as when new. Wash well in running water, and dry over a spirit lamp. This will not, of course, remove scratches or blemishes of the film.

Photographs should be retouched, waxed, and burnished, and copied in diffused light.

Engravings also are best copied in diffused light. Fix the negative with cyanide, to keep the lines clear; but be careful that it is not strong enough to have effect on the film. If the image has not sufficient contrast, intensify as before described.

Unmounted and wrinkled pictures should be placed in water and pressed out on a piece of glass, under which they can best be copied.

Oil Paintings require treatment varying according to their character.

CHAPTER XII.

PHOTOGRAPHIC AESTHETICS

IN this branch of my subject, difficulties beset one at every step, because a great majority of photographers are ignorant of the principles of art, and many among them quite ridicule any combination of photography and art.

To counteract, so far as is possible, this very erroneous idea, it may be useful to give a few hints on the application of art principles in the daily work of the studio ; and here, in the limited space at my command, and the necessity for simplicity of treatment of the subject, is one of the principal difficulties.

Likeness is certainly the first object of importance to the photographer. Scarcely second to it is artistic arrangement ; but art culture, by educating the eye to seize salient features, to select the most suitable view, and to arrange the light to the best advantage to bring out the effect of character, as well as giving prominence and force to natural advantages, and concealing defects, really aids the photographer in securing likeness.

It cannot be denied, by any one with experience of the different results obtained by different photographers, that

superiority is attendant on the higher knowledge, not only of chemicals and manipulations, but of the principles and application of art; nor is it the cultivated eye alone that demands good composition in a picture, but the ignorant and uneducated experience a sense of fitness and symmetry in the well-balanced work, though they may not be able to define the cause.

Balance.—With the portrait photographer is the power, to a great extent, of governing the disposition of the lines. He may, if he find several lines running in the same direction, alter the pose or the drapery to introduce opposing lines to the composition, or even, by means of a curtain or accessories, to supply them. The necessity of lines of balance in a picture cannot fail to strike one with the most limited appreciation of art, on looking at a picture devoid of such lines. If the lines run in one direction, diagonally, whether parallel or not, a weak, tumble-down appearance is given, and a sense of falling is suggested to the mind of the spectator. It may be urged that, it being necessary to supply compensating lines to those of diagonal tendency, it would be safer and more satisfactory not to use them at all, but rely on the horizontal and vertical form. The answer to this is, that in the last-named there is not sufficient variety, and that the picturesqueness of the pyramidal form is far greater than of the square.

As an example of the pyramidal form of composition, the reader cannot have a better than Wilkie's "Blind Beggar," nor read a more excellent treatise on art than Mr. H. P. Robinson's remarks thereon in his "Pictorial Effect in Photography."

Variety, as a quality of good composition, is of such obvious necessity as to need no lengthy argument for a recognition of its power; its antithesis, monotony, is quite

fatal to a picture. In fact, it may be said that composition teaches the proper use of variety. One of the chief sources of beauty and picturesqueness is variety, idealising the real ; but, notwithstanding its power as one of the principal characteristics of symmetry and beauty, even of its absolute necessity in the production of the picturesque, it may be, and often is, carried to excess.

Simplicity must not be lost, or, like the rhetorician who becomes involved in his argument, be it never so ingenious, producing in the minds of his hearers a helpless feeling of being entangled in a labyrinth of metaphor, the result is—chaos. Variety should be studied in photography for the sake of contrast ; but simplicity and repose must not be lost sight of. Nor are uniformity and simplicity in composition antagonistic to variety, but, as in the case of a group, the introduction of repetition in the pose of some of the figures, amid their varied and irregular positions, will actually increase rather than diminish the variety, and give motive to the composition.

Suggestiveness.—The skilful artist has always some story to tell in his composition ; but it is not well or satisfactory that it should be done so thoroughly that the spectator feels there is nothing beyond. Art rather suggests, or tells a tale up to a certain point, leaving it to the spectator to supply the sequel in imagination.

Brilliancy is a very necessary quality in portrait photography, and is an effect produced by the illumination, not the chemicals. There is a prevalent and erroneous idea among photographers that the nearer the sitter is placed to the light, the harsher the result ; whereas just the opposite is the consequence. The nearer the sitter is placed to the light the more brilliant, but not of necessity any the harsher, is the effect. Distance from a weak light generally tends to harshness (or that quality known as “ hardness ”)

of the negative); therefore if the sitter is seated a long way from the light, and softness is the required effect, admit more light, rather than cut it off.

Relief.—Do not in this respect attempt too much. As a flat effect, without proper shadow and contrast, is very unpleasing, so is the opposite extreme inartistic. A certain amount of relief is necessary, to give roundness and solidity to the picture, in the same way that a degree of contrast is requisite; but as violent contrasts produce harshness, so too great appearance of relief gives a hard woodeny appearance.

There is great difficulty in treating of these matters within the limits of this chapter, for all the writer can indicate is that there is a certain point beyond which it is vulgar and inartistic to go, without having the power to define this line of demarcation. The student must study art and the works of the great masters to be able to appreciate the distinction for himself.

It must not be supposed that even in this domain of art the artist, with only his artistic knowledge to guide him, can walk at once into a photographic atelier and pose and illuminate properly, in a photographic sense. It is not so, because the effect produced by our chemicals is not that seen by the eye; the pose is restricted in a certain sense by the imperfections of the lens, as the lighting must be modified to produce a given effect on the sensitized plate. Contrasts which to the eye of the artist are correct enough, are much more violent when pourtrayed by the camera. What is wanted is the artistic photographer.

CHAPTER XIII.

EXPRESSION, POSING, AND ILLUMINATION.

IT has been said that in all men there is something good and noble and beautiful ; it is very difficult often to find it, but whether we accept the axiom or not, it is certainly the duty of the photographer to make the best of his sitter ; the best in every way, especially of his face. Some persons have the gift in their intercourse with the world of being able to bring out the best qualities of those with whom they come in contact, exercising an influence over others subtle and beneficent ; this rare quality is not necessary in its moral sense to the photographer, but he should have at least the ease which produces ease in others.

It is unnecessary here to speak of the rough and unmanly specimen of humanity sometimes to be found in photographic galleries, whose every word, gesture, and action produces a discordant and worrying effect on the unfortunate sitter who has submitted himself to the tender mercies of such a boor ; but even among the operators who do not come under this category are those whose

unsympathetic nature does not allay, if it does not excite, a feeling of unrest which is so harmful to the picture in the expression called up by disquieting influences.

Ease of manner is not at the command of every photographer, but he can feel and express an interest in, and consideration for, the sitter which will in most cases call forth a corresponding feeling.

There is no formula for making "expression," as there is for baths, collodion, or developer; but by observing those simple rules of kindness, courtesy, and consideration, very much may be done to set people who visit photographic galleries at their ease, and to lighten to a considerable extent your own trials.

With children a great deal of tact is necessary, and the experience of paternity, which it is the author's misfortune (perhaps) never to have had, may be very useful. I do not know that I should advise any one to launch into matrimony with this object only. With children you must possess childish sympathies; assuming it, is seldom successful; disguise your earnest intention of taking that child's portrait, and be prepared to devote a good deal of your time, if necessary. If the baby will appears to be set against your own, it is always possible to humour it into acquiescence, or, under the semblance of play, to accomplish grand and unlooked-for results. Children are our most picturesque models, and often our best friends, for through their hearts those of their elders are gained.

POSING.

Of the multitude who sit for photographs, only a few individuals are naturally easy and graceful. There is an uncomfortable feeling in the minds of most, that now they are in the posing chair they have some expression to assume. By your manner you must endeavour to make

them abandon this feeling. As you converse with them, study their natural pose and character.

Having selected in your mind the position best suited for a satisfactory picture, begin the pose. Look to the general effect, first to see that the outline is good, and in accordance with the rules of art.

The head should be of easy pose, and well balanced by the shoulders, not on one side (I speak of outline), giving an unstable appearance; the shoulders, bust, waist, and the dress in turn. Preserve and restore all the curves that give the oval form to the head, and destroy all the lines and angles in the dressing of the hair which have the effect of marring the natural contour. Take care that this outline stands well; that the figure and its accessories, well sustained and strengthened in every part, rest in firm and secure repose at the base, that no appearance of weakness may spoil the effect.

This secured, the rest is generally only a matter of detail—lines to be altered, balanced, or destroyed. As a broad rule, the head should turn in a different direction to the body; this gives force and character. With the three-quarter view, or approaching thereto, the head may lean a trifle on one side *towards the camera* (not the reverse), where force and strength are characteristic. Where the outline can be preserved, it is generally well to pose the body not quite full to the camera. The line of the arms should be curved, not angular, and where it is possible to do so, *without appearing to intend it*, the hands should be hidden. Never permit the hands and arms to obtrude themselves as objects of interest, as in a photograph they are generally quite the reverse. It must be borne in mind that the head is the principal feature, and anything detracting from its interest is an artistic fault.

Imperfections of the Face.—Every face has, artistically speaking, two sides and several views. To select the best side for a portrait, we must judge of the several features, and strike a balance between them. The following hints are, with the exceptions that govern all rules, safe to follow:—

The Hair.—Most gentlemen, and some ladies, part the hair at the side, and, there being no reason against it, that side is generally selected, except where the hair is beginning to grow thin, when the other side is to be preferred.

Red hair should be powdered for ladies, as also, in some cases, very light hair, and relieved by a dark background. With very black hair, also, it is sometimes necessary, to prevent total loss of detail.

The Forehead.—In the case of a very high forehead, shorten by depression of the head.

The Eyes.—Blue and light eyes should be turned from the light, as a rule. A defective eye should of course be turned from the camera, and a profile view, if possible, should be made. Where the eyes are unequal in size or height, take the larger and higher respectively, no objection offering. Small and partially closed eyes should be made to look up, or, in a full face, depress the chin slightly, the eyes looking into the camera. Large and staring eyes should be a little lowered. Deep-set and sunken eyes require considerable front light, and very little top light.

In a full face the eyes may look into the lens, or at an object fixed near it, the body being turned away more or less; never should both body and head be presented perfectly full to the camera.

Never allow the eyes to be turned in a different direction to the head. The effect is very unpleasant. The head turning to the right, the eyes must also take that direction, and *vice versa*.

It is well to have a set of spectacle frames of different patterns, to be worn by persons in the habit of wearing glasses. Where it is necessary to photograph them with their own glasses, be careful to guard against false reflections on the eyes, and refraction on the side of the cheek, seen through the glass.

The Nose is rarely perfectly straight, and often materially alters the character of the two sides of the face. The nose being twisted has the effect of shortening it on one side, and lengthening it on the other. In the case of a nez retroussé the head should be slightly depressed, or the camera raised and pointed down. Round and flat noses should be taken in profile.

The Cheeks.—High cheek bones and sunken cheeks should be lighted from the front, and top light avoided, or be taken in profile. Wrinkles should also be lighted from the front. A swollen cheek should be avoided, or hidden by the hand.

The Mouth.—Small mouths should be taken full view; large mouths as much in profile as possible. Open mouths generally have a tightened and painful appearance when closed, but may be judiciously hidden by the hand, fan, or a flower.

The Hands, when introduced, are always troublesome, and should be kept back in position and tone as much as possible. When it is impossible to avoid their introduction, turn the edges to the camera, and carefully guard against leaning the arms too heavily against anything to distort the outline into unnatural lines or flattened unshapeliness.

It is impossible to give any very definite rules for posing, as it is an art of itself, requiring study, feeling, and a perception of the beautiful.

LIGHTING THE SITTER.

The photographer has at his command three kinds of light: direct, diffused, and reflected. Diffused light plays the principal part in the lighting of the photographic model, but diffusion of light over the whole face would render it weak and flat, and, destroying contrast, the result would lack vigour. Opening a small portion of the side light well in front of the sitter, and perhaps a little from the top, *direct* light is admitted, giving roundness, boldness, and vigour to the lighting, and supplying the high lights. See that the extreme point of the nose is the lightest part of the face, a light resting on the edge of the bridge of the nose nearest the light, and that the little streak or spark in the eyes is in the same position in each. The shadow side of the face, while it is darker than the side to the light, should be full of detail, soft, and transparent. Against this light and shadow the graduated background should be placed in harmonious contrast. Reflectors of white calico are sometimes useful in lighting up the shadow.

CHAPTER XIV.

RETOUCHING THE NEGATIVE—THE RETOUCHING FRAME, ETC.

The Scope of Retouching.—Much has been said and written against retouching, and as it is a subject which is attracting more and more attention of the artistic photographer, a few words in reply to the objections raised will, I deem, be in place, especially as a great deal that must be conceded to the position of the objectors will serve as a warning in the use of this important and beautifying operation, especially as most of the hard things said of retouching apply to the abuse rather than the proper use of the pencil.

To those who hold that a negative should not be touched at all, I fear no arguments would avail, as not the most convincing argument will ever move *prejudice*. From all that I have seen or heard of these objectors, their ideas are based on the ground that the retouched negative ceases to be a *photographic* production. If this is so, which I do not by any means allow, it still fails as an objection where *any* process improving photographic productions, and every means of whatever kind tending to an artistic and truthful result, should be warmly welcomed.

It is, however, on these points of

ART AND TRUTH

that the true objections resolve. Are the artistic and truthful qualities of the portrait enhanced or not by retouching?

Too often they are not only not added to, but entirely obliterated.

Still the fault is not with "retouching," but an injudicious removal of all lines, muscles, natural defects and CHARACTER from the face. Thus, under the hands of the mechanical, unthoughtful worker, that index to character, the face, loses every line and shadow that gives it individuality, substituting an unmeaning block of ivory-like roundness and polish *and vacancy*. Under such a polishing process all claims of art are thrown aside—all truth is obliterated. The evidences of the ravages of age, by the agency of the retoucher's pencil, are wiped away, and a staring wax face left to represent (?) a human face.

Had my pen a good sarcastic point to it, then would I worry these rogues who so falsify photography and bring such discredit on the profession they pervert; but, unfortunately, such means are popular! There is, be it confessed with sorrow, a touching confidence in the *truthfulness* of the camera directly its work is falsified, and in proportion as it is thus flattered. Mrs. Fortie cannot gaze with fortitude on the evidence that she is no longer young, but complacently smiles on the picture which represents her as buxom twenty. It cannot be urged that photographers must supply what is demanded, for they themselves unloosed the giant they have now to fight.

Another real objection is, that where, before the introduction of retouching, the operator strained every power to make each negative perfection, he now is careless, leaving it to the retoucher to supply all deficiencies of lighting and development, and to "dodge up" generally

This should not be ; it is an abuse of power which should be vigorously fought, but is no objection against retouching, any more than would the statement that the convenience of railways causes people to neglect taking sufficient exercise to keep them in health, be a reason for the abolition of convenient and rapid locomotion.

But I fear my reply to those who object to retouching has taken the character of a little abuse, on my own account, of those who misuse the pencil and brush. Let it stand so ; perhaps in that form it may have more weight.

Retouching was introduced by gentlemen whose artistic taste was shocked by some of the more glaring shortcomings and falsifications of the photographic camera. My readers know, or will learn as they gain experience, that the camera does *not* re produce an image as it is visible to the eye. Nor am I now speaking of colour, but that representation an artist would make of a sitter in black and white. To quote an instance or two :—Freckles, often not perceptible to the eye, are brought out by the camera as black spots. Surely here nature is falsely pourtrayed, and their obliteration by retouching is allowable. Take a sitter with that much-admired tint of hair, auburn ; how does the camera reproduce that ? As black ! Here something must be done. In the first place, powder is applied to the hair before the sitting is made, and the negative is retouched.

Retouching, then, should be used to remedy these and kindred defects of photography as it is with our present appliances and knowledge, and accidental defects of the negative which cannot be remedied by a second sitting.

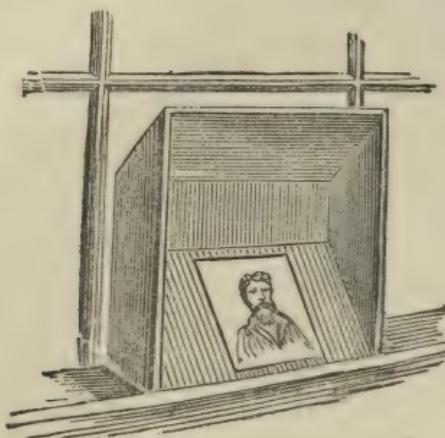
Preparation of the Surface of the negative is necessary, as the glaze of the varnish will not receive the pencil-marks. For this purpose I have found spirits of turpen-

tine rubbed on those parts to be retouched give an excellent surface or "tooth," where a great amount of work is not requisite. The addition of cuttle-fish, very finely powdered, to the spirit of turpentine, has been recommended; but very finely-powdered pumice-stone has the largest number of advocates. To prepare it, rub together two pieces of the stone, by which means you are enabled to get it very finely powdered, and entirely free from grit. This powder is kept in a fine muslin bag, through which it falls when lightly dabbed on those parts of the negative to be touched. Rub the powder very gently with the ball of the finger until the glossy surface is removed, but not sufficiently to scratch the delicate film beneath.

Caution is necessary to rub off only the polish of the varnish, which must, of course, be perfectly dry and hard—and only rubbed on those parts on which you want to work. The negative, thus prepared for the reception of the pencil, is placed on the

Retouching Frame, of which there are several patterns sold by the stock dealers. In its more elaborate form it consists of two frames and a lid. The bottom frame, resting on the table, holds a movable mirror to reflect the light to the under side of the negative; to the front of this frame (that nearest the retoucher) is hinged another frame of ground glass, on which the negative to be retouched rests, which opens to an angle of about thirty degrees. On the further (and, when open, higher) edge is hinged a light lid of wood opening to nearly a right angle with the frame on which the negative is retouched, which shades the extraneous light from the eyes of the worker. This, rising above the head of the retoucher, has to be sometimes supplemented by curtains on each side. These frames are very handy, being extremely portable.

but I am compelled, except on dark days, to substitute a sheet of white paper for the mirror, as the glare of the reflected light is very trying. Where a window of northern aspect may be commanded, I have used a home-made frame, costing very little, and being much more serviceable. The subjoined sketch will, I think, explain it.



If a reflector is needed, a sheet of white paper is placed on the table, or a mirror when the light is very weak. I have no ground glass under the negative, as I find no use for it, and the eyes of the retoucher are splendidly shaded without the necessity of smothering the head in a dark cloth.

A sheet of brown paper with a small hole cut out is placed over the negative and aperture of the frame to shut out the light, except just where you are working, preventing an excessive glare to the eyes, and rendering the illumination of that portion to be worked upon more brilliant.

Retouching Materials.—Pencils, Faber's H, BHH, and B; "stumps," which can be made by rolling up tightly a piece of unsized paper for rubbing in large shadows that require

softening (the lead may be scraped off a B Faber); india ink mixed with a little gum.

RETOUCHING

is a special branch for the artist, and can only be acquired by practice. It calls for the exercise of the most exquisite taste and discrimination, and, of course, a knowledge of the anatomy of the human face. If the operator be an artist, and possess these qualifications, there is no reason why, with practice, he may not excel as a retoucher to a greater extent than the artist who has not his knowledge of the negative; but it is those operators and retouchers who have not the proper qualification that have produced so many libels on photography and art.

It were well to have a print from the untouched negative, that you may the more readily see what is required to be done.

To prepare the pencil, cut quite a long point, then sharpen the point on emery paper, finishing off on a piece of drawing-paper. This will give a point sharp as a needle, with which the most delicate work may be done. To be able to work with this long sharp point proves that you have the *mechanical* skill requisite for retouching; your artistic knowledge is proved by the use you make of this skill.

Look over your proof to see what imperfections are to be removed—hard lines to be softened, and dark shadows reduced in depth. With freckles, the work is done with the pencil, stippling them in to the density of the flesh. Do not attempt too much at a time, or you are liable to break through the varnish of the negative. Holding the pencil lightly with the tips of the fingers about two inches from the point of the pencil, and working freely, you will

find you get on better than by holding it tight and close to the point.

The Eyes.—Many retouchers take out the pupil of the eye with a needle point, and work in a catch light in place of the natural light. *Nothing, I think, can be worse*, as it gives a staring and unnatural expression. The negative (if good) of a sitter properly illuminated should give the eyes of proper tone, and with a good catch light, which at most may require strengthening a trifle.

The Nose may require straightening in cases where, thinning just below the bridge, the shadow is carried a little over the line, and gives the nose an appearance of being on one side. This must be done judiciously, and not to falsify nature. On the light side is a high light and a point of light at the tip of the nose; avoid making this a conspicuous white streak, as if the sitter was embellished with a streak of white-wash on that feature.

The Mouth.—The expression may oftentimes be lightened and improved by strengthening the light on the top of the upper lip, and especially towards the corner, thereby raising it and giving it a pleasant expression. The shadows at the corners of the mouth are often exaggerated, and should be lightened, but by no means obliterated. The lips sometimes present a blotchy and broken appearance, which should be touched out. A light on the fleshy part of the lower lip, on that side to the light, should be also strengthened a little; but care must be taken to keep these diffused lights subordinate to the principal high light, that they do not appear as lights speckled on at random to divert the eye from the main features, and to destroy the harmony and repose of the portrait.

The Cheeks.—Smoothness and roundness should *not* be the sole object of the retoucher, but the muscles of the face must be preserved, or much of the character and

likeness will be lost. An exaggerated hollowness of the cheek produced by defective lighting may, however, be worked up with good effect.

The Neck often requires work similar to that bestowed on the face to restore smoothness and obliterate blotches, detected by the jealous eye of the camera, but scarcely, if at all, perceptible to the eye.

Expression can to a certain extent be modified in the retouching, though of course great care must be exercised. Seriousness may be considerably reduced by lightening the shadows of lines about the mouth, and giving the mouth an upward curve by working out the depression of the corners. In the case of a scowl, touch out the lines between the eyebrows, and lighten the shadows under the brow, and soften the deepened line across the forehead. Where a smile is not too outrageous, it may be decreased by curving the muscles about the mouth downward, working out the upper portion of the shadows which denote them, and making the most of any slight shadow extending from the corners of the mouth downward, and by depressing the upward tendency of the corners, as indicated by shadow.

It is, perhaps, superfluous to add that great care, and indeed skill, is requisite in these operations. More particularly where such radical changes are to be made, is it necessary to have before you, as you work, a proof, and as the retouching progresses it would be certainly advisable to take other proofs from time to time, that you may judge accurately of what has been done, and what remains.

Detail in the Hair, Beard, &c., is worked in with the lead pencil; and if this is not sufficient, the brush with india ink must be used; but this work should only be

attempted by the artist who has a perfect knowledge of drawing, or a painfully wiry appearance is given.

The Hands, when darkly shaded, show the veins and knuckles marked unnaturally strong ; these shadows should be considerably reduced in strength.

For Dark Shadows the stump is used, rubbing over with it the lead of the B pencil. Care must be observed that too much is not put on at first, as it cannot be afterwards removed except with pumice powder. When the lead has been evenly applied over the part to be retouched, finish with the HHH pencil.

Where a sitter has moved, and a blurring of the eyes has resulted, and the facial lines are doubled, a few judicious touches, obliterating shadows and putting in lights, will have a wonderful effect, but will not do everything.

A Few Words by Way of Caution.—The retoucher has in his pencil a wonderful power for good or ill. Do not abuse this power, but keep it within the bounds of reason, and make it subservient to the demands of art and truth. If the retoucher has a true artistic instinct, he cannot be otherwise than truthful, for the *perfection of art is TRUTH*.

PART III. PRINTING THE NEGATIVE.

CHAPTER XV.

THE PRINTING, SENSITIZING, AND TONING ROOMS.

EVEN in galleries well fitted in every other respect, the printing department is one too often not properly considered, the general opinion being that almost any place is good enough. Why this should be so I cannot quite understand, unless it is that in general the department understood and practised by the proprietor is that of the skylight and dark room, and of consequence ranking first of importance in his estimation.

It is needless to say that, although fine work is undoubtedly done in printing under tremendously disadvantageous circumstances, it might easily be surpassed under better conditions. The position of a printer in some establishments is no enviable one—frozen in the winter and roasted in the summer, and at all times labouring under the disadvantage of performing all kinds of mani-

pulations in one cramped room. I do not now intend to raise a plea for the "*poor printer*." The worker is not a being to be studied. Pray, is he not paid? But the quality of the work, and the reward for any rise in the standard, is, I am sure, an argument that will be recognized by all. To the photographer who desires to take a front place in his business, completeness in all his arrangements is entirely necessary. Of course, much depends on this ambition, but it is certainly a point that deserves consideration, if his business is to be successful.

The manipulations should be kept apart to ensure success, and though, as I before indicated, much very good work is done in the worst and most inconvenient printing rooms, I maintain that three separate rooms should be exclusively set aside for printing; to the uses of sensitizing and drying the paper, the printing of the negatives, and for toning, &c.

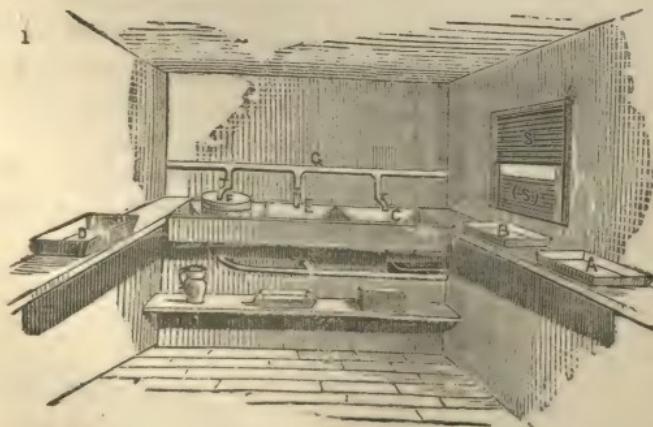
THE SENSITIZING AND DRYING ROOM

is a dark chamber, lighted with gas. It should be fitted on one side with a convenient shelf or table on which to rest the silver sensitizing dish. On the opposite wall should be fixed an open rack, fitted with clips for holding the sensitized paper. This rack is merely a light frame with bars running across at a distance apart of about six inches, and to these bars the paper clips are affixed, so that when the sheets of paper are hung for drying there is little danger of their being blown together and sticking to each other under the influence of any slight draught. The rack is suspended about four feet from the floor, so as to be easily got at. Under it may be affixed a row of gas jets to dry the sheets, or more economically, but more slowly, the drying may be effected by means of a stove.

In this room the filtering of the bath may be done—not the boiling, as that may be more suitably done in the toning room when in disuse, or in some convenient place that may be found for renovating the baths, both negative and positive; but the ordinary filtering and strengthening of the baths may very properly be carried on in the silvering room without hurt. Provide large white glass bottles to hold the bath, funnels for filtering, filtering paper, a graduated measure and hydrometer for purposes of testing the strength of the solution, litmus paper, and a paper knife. For these there should be found convenient places in which they may be kept *and found*.

THE ROOM USED FOR TONING, ETC.,

is more extensive in its fitting, and should be so designed that while being quite convenient for working, dangerous agents should be as far apart as possible—as, for example,



the fixing solution, hyposulphite of soda—from the toning bath and unfixed prints. In the design given this has

been done, it will be found. A is the dish in which the washed prints are in place near the toning dish B. The window at back of the toning dish is fitted with dark shades, S and (S) to regulate the light, which must be weak and diffused, to save the prints from discolouration. Toned, the prints are placed in a dish at C, thence they are placed in the hypo dish D, which is quite distinct from all other dishes, as splashes from it are quite fatal to the prints. When properly fixed they may be washed in the trough marked E, and then placed in the tub F, and thoroughly washed. This tub is fitted with a perforated false bottom, so that the prints may be perfectly washed in all parts. The tap and waste pipe are so arranged that a certain quantity of water may always be retained in the tub, although there is constant change of washing water, it being necessary to thoroughly eliminate the hypo from the prints. The arrangement of water and waste pipes can be understood from the sketch ; G, supplying the washing water ; the waste pipe carrying away the washings of the prints before and after toning, runs into a tank and is preserved ; those of E and F running to waste as being hardly worth preserving for reduction for the silver, the per centage being very small. The toning room may also be used for various purposes. Baths may be boiled here, but not if a convenient place elsewhere may be found, the potash and acid dishes for removing collodion films from old used negative glass, and for other operations.

THE PRINTING ROOM.

- This room should be so designed as to allow of the printing to be carried on within the apartment in stormy and cold weather. A shelf fitted from a large window, and the sash built out to cover it as a protection for the

negatives against frost, snow, and rain, will save much time that would otherwise be wasted in unpropitious weather, paper wasted in the advent of an unlooked-for storm, and many negatives broken by exposure to the changes of temperature.

Outside, on a roof or ledge, are built stands for the reception of the printing-frames, both of sunshine and shaded aspects, to suit the varying character of the printing clichés.

The stands are built with sides sloping at an angle of (say) forty-five degrees, with ledges, so that several rows of card printing-frames may rise one above the other.

Adjacent to the roof used for printing, on which the stands are placed, is the printing room, fitted with the window for indoor printing, described above. It should be furnished with convenient drawers for sensitized paper for printing, and the prints themselves. These drawers should be so arranged as to admit as little light as possible when they are opened for the purpose of extracting paper, in the case of the sensitized paper drawer, or with that for prints, on placing a finished print therein, as discolouration of the paper or of the prints ensues on the entry of light. To further prevent this, the drawers might be fitted with sectional lids inside, so that even when drawn out the light cannot penetrate.

Drawers, also, for unsensitized paper, plain and albumenized.

Shelves running round the apartment to hold the stacks of negatives in use, catalogued either under letters or numbers; the former, of course, is to be preferred, there not being the necessity for constant change, as in the case of numbered negatives, which are always progressing. On this point, however, there may be prejudice in some minds.

against the name of the sitter being attached to the negative.

The Fuming Box may be kept in this room. I shall not discuss the *pros* and *cons* of this troubled question of fuming. Certainly, in many cases it is very advantageous, and, I believe, generally, the paper prints richer, more brilliantly and rapidly, and tones more easily and with better results.

The fuming box is constructed to hold several sheets of paper at a few inches apart. A false bottom about six inches from the bottom of the box is perforated with holes, and underneath it is a drawer in which the ammoniæ dish is placed. The utility of the drawer is that the dish can be placed in the *centre* of the box, on its being shut up, whereby more even fuming can be ensured.

The Temperature of the Printing Room is a matter that should be looked to. A stove in the winter and ventilation in the summer should keep the apartment at an even and comfortable temperature all the year round.

General Remarks.—The printing room should be kept scrupulously clean, and as free from dust as possible. A bench will be found useful for many purposes, as filling the printing frames, making printing openings for the negatives, stopping out, cutting prints, &c. A box or basket should be kept for the reception of silver paper cuttings, as they are preserved, burnt, and reduced for the extraction of silver. .

CHAPTER XVI.

THE PRINTING OR "POSITIVE" BATH.

As the success of the photographic picture is judged from the resulting prints, a great responsibility rests with the operator in this branch of the work, and it should be his aim to get the very finest results. To do this he must studiously observe the effect of every change of condition in paper, bath, fuming, toning, fixing, &c., and acquire the power of producing any required effect. Doing this with intelligence and certainty, he becomes a first-rate printer; failing this, though he may occasionally produce good work, being the result of accident, it is of little worth.

To attain perfection, the printer must have a thorough knowledge of the printing qualities of the negatives entrusted to him, and have complete control over his chemicals.

His first study is the effect produced by the different brands of commercial albumenized paper, and the particular kind of work for which they are most suitable. I shall not enlarge on this subject, as it is a matter for individual experiment, and one which is continually being modified and altered as new brands of paper are introduced.

THE PRINTING BATH.

The bath used for sensitizing the paper to be used in printing is, however, a branch of photography which has received so much attention and study, that certain safe rules have been formed. Of the strength of the bath—one of the first considerations—there is, as with our negative bath, a difference of opinion, some authorities maintaining that a strong solution produces the best prints, and others giving preference to a weak solution. As in the case of the negative bath, so in this case, I cast in my lot with those in favour of the comparatively weak bath, or, perhaps, more strictly speaking, one of medium strength ; the mistake being, I think, in the two extremes. It might be supposed that the weak bath would require an extended floating of the paper on its surface, and the strong a short floating—but this is not so ; and, further, it might be expected that the paper floated on a weak bath takes up less silver than from a strong bath—this also is an error, for the albumen will take up the amount of silver it requires, whether the bath is strong or weak.

From the fact that the effect of the strong solution is to coagulate the albumenized surface of the paper (and it is some time before the albumen commences to absorb the silver, whereas on the weak solution the albumen, not being coagulated, more readily takes up the silver), we learn that a strong bath requires a long time of floating, and that a weak bath takes but a short time ; the bath of medium strength being between these two extremes in the time required for floating the paper.

This, then, would tend to prove that the gain in time would establish the weak bath as superior to the others ; but there are awkward consequences in floating the paper

for a short time on a weak bath, as in the long floating on the strong bath. The paper floated on a strong bath certainly prints brilliantly and with bold effect, but the bronzing of the shadows is a great defect, and the weak bath has the effect of producing weak prints, or, if the time of floating be lengthened, the print has a sunk-in appearance.

These objections, then, seem to indicate that there is a happy medium, and this appears to be in the bath from 40 to 50 grains to the ounce of water, for ordinary work in portraiture.

For the positive bath, nitrate of silver and pure water are required. Dissolve the silver thoroughly in the water, and test with the hydrometer for strength. I have found alum a good thing for the printing bath, its effect being to harden the albumen, and thus keep the silver more on the surface. The best way of adding the alum is to place a small lump in the neck of the funnel through which the bath is filtered, and it thus takes up the required amount.

The loss in strength of the bath after sensitizing paper should be made up from a stock bottle of sixty-grain solution, so that the bath may be kept as nearly as possible of an uniform strength.

Citric acid is added to the bath where it is wished to preserve the paper beyond the ordinary time for general use, to preserve it against discolouration.

Nitrate of ammoniæ is also sometimes added to the printing bath—nitrate of ammoniæ 35 grains, and nitrate of silver 40 grains to the ounce of water, slightly alkaline with liquor ammoniæ. This bath should be placed in the sun until all impurities are thrown down, and then filtered before use.

RECTIFICATION OF THE PRINTING BATH.

The causes of disorder in the printing bath are from albumen dissolved from the surface of the paper, and organic matter and dust which gain access to it, and from imperfect filtration, causing the bath to discolour.

Permanganate of Potash.—When only showing a slight colour, or evidencing but trifling irregularities, a few drops of a solution of permanganate of potash (ten grains to one ounce of water) may again and again prove sufficient to restore it. Add the permanganate solution until a slight rose colour appears, place the bath in the sun in a clear white bottle, when it will further discolour, and eventually grow clear as crystal, the impurities depositing at the bottom of the bottle. Filter clear. It is advisable to keep the bath exposed to the purifying influence of light when it is not in use.

Kaolin is also a good purifier. Place a little in the bottle holding the bath solution, and stir with a glass rod for a short time. When the kaolin is settled, *decant* the solution (or pour off without disturbing the deposit of kaolin), and filter. The kaolin may thus be used again and again.

Boiling the Bath.—The printing bath will require more energetic treatment, in time, than those advocated above; and, though it is not a bad plan to boil at stated intervals, whereby certainty is ensured, yet it is not absolutely necessary to remove the impurities we know must exist in the bath, until their deleterious effects manifest themselves. The bath is first made *slightly alkaline* (if not so) with ammoniæ, and then placed in an evaporating dish on a small gas stove, and submitted to heat until it has evaporated about one-half or two-thirds of its bulk. By this time the impurities which have made it black and thick

during the boiling should have settled. Now turn off the gas and allow the solution to cool, add pure water to reduce it to the proper strength, and add the nitrate used in the original making up of the bath, and test its alkalinity; filter perfectly clear, and the bath is ready for use.

TO FUSE THE BATH.

Place the bath solution in the evaporating dish over the gas stove, and boil down to dryness, as advised with the negative bath (see Chapter IV.), using the same precautions against the formation of the explosive fulminate of silver. It may be necessary for this to add acid. Stir the mass at the bottom of the evaporating dish, and, when cool, add pure water, and filter. The organic matter, which has been carbonized by the heat, will filter out, leaving the solution quite pure and clear. Now make up your bath according to the formula of the original.

GENERAL HINTS ON THE CARE OF THE BATH.

Care will, in a great measure, do away with the necessity of constant doctoring of the bath. Guard against the admission of dirt and foreign chemical substances. Keep a separate graduated measure and hydrometer for testing the strength of the solution, and see that they are always scrupulously clean before using them—much trouble and uncertainty may in this way be spared. The sensitizing dish, when the solution is poured back into the bottle, is stood on one corner, to allow it to drain; it may then be rinsed with clean water, the rinsing being preserved, and the dish put away in a clean cupboard resting on pure blotting paper. The bottle holding the solution is then placed in the sun, the top of the bottle being covered, to screen it from dust.

CHAPTER XVII.

SENSITIZING THE PAPER—THE PRINTING-FRAMES.

A CONSIDERABLE amount of mechanical skill is necessary to properly silver the paper for photographic printing, and on the success of the operation depends the subsequent results and the economy of the department. To find, on cutting up a sheet of paper, most of the pieces spoilt by white, insensitive spots, caused by air-bubbles between the paper and the solution, is mortifying to the pride, when it is remembered that they are evidences of want of skill or care; and to the same lack of carefulness and skill are attributable other failures.

Unless your work is on a very small scale, it is advisable to silver whole sheets at a time, there being less waste of time and material with sheets than with halves or quarters. The porcelain flat dish is the best kind of dish for holding the sensitizing solution, and the depth of solution should not be less than one inch.

The sensitizing room should not have any inlet for actinic light, or in drying the paper it is liable to get discoloured and spoiled. If you sensitize by a window, shade it with a yellow blind or paper.

In preparing to lay the paper on the bath, first turn up

the four corners at about an eighth of an inch from the edge of the paper; this spares you the necessity of immersing the fingers to take the sheet from the bath. The paper, previous to sensitizing, should have been kept for a day in a cellar or damp place, especially in dry weather, when the albumen is hard, and not only repels the bath solution, but is apt to crack. It is sometimes well to bend back the edges of the paper by drawing the thumbnail gently all round the sides of the *back of the paper* at about a quarter of an inch from the edges (care being taken not to crack the albumen), that the paper may not have any angles to sink below the surface of the solution, and cause it to flow over the back and spoil it. Place the dish before you, its length being from right to left.

Sensitizing the Paper.—Take the diagonal corners of the sheet in your hands, holding them between finger and thumb, the length of the paper to correspond with the position of the bath, and let the sheet assume a curved position, the left-hand corner being the lower. Place the sheet at this point on the solution, about the centre of the dish, taking care not to touch the solution with your fingers or to submerge the paper. Still holding the right hand high, but lowering it gradually, gently draw the portion of the paper in contact towards the corner it will occupy when the entire sheet is on the solution; by the time it has been drawn to this spot (the paper being gradually lowered by the right hand), the entire sheet should repose on the surface of the bath. By drawing the paper over the solution in this manner, air-bubbles are driven before the paper, and if there are any under the paper at all, they will be round the edges, and a tap of the finger-nail will be sufficient to liberate them. Frequently, the edges of the paper will curl when first placed upon the bath, but gently breathing on them will immediately

flatten them. Should there be any drops of solution on the back of the paper, they should be blotted up dry with white blotting-paper.

The paper is now gently lifted at one corner to be examined, and carefully replaced if quite right, and another corner raised ; by this means we can detect and rectify any little defect in the original placing of the sheet. Having silvered the proper time, take hold of the left-hand corner of the paper nearest you with the right hand finger and thumb, and slowly raise the paper until you can take the other corner with the left hand ; now draw the paper across a glass rod fixed on the left-hand edge of the bath, or if the edge itself is quite even, it may be used, so that the superfluous solution is taken from the surface of the paper. The sheet is now placed in clips fixed over the bath, so that any drippings may fall therein. It should be so arranged that the falling drops may run down the inside of the dish, and not on to the surface of the solution to cause splashes, or on the back of the paper. The sheet is kept here until another is placed on the solution, when it can be removed to the drying place over the gas jets or stove.

The time of sensitizing the paper, exactly like that of the collodionized glass for the negative, though to a greater extent, is dependent on circumstances, and to state any time is only to mislead : temperature of bath and weather, the strength of the bath, the brand of paper, and the character of the negatives, all have their influence on the judgment of the proper time. It is a matter for personal study. With the plain nitrate of silver bath of the strength given in the last chapter, from forty-five to sixty seconds, under ordinary circumstances, will be about the time in the summer, and sixty to one hundred seconds in the winter.

THE DRYING OF THE PAPER

should not be too slow. The sheets are placed in the rack over the gas jets, a piece of thin metal being interposed between them and the gas. The lower corners of the paper may be prevented from curling by attaching to the lower edge a stick attached to two clips, which hold them down during the process of drying. In the summer it will not be necessary to apply more heat for the drying than just enough to banish the slight trace of dampness in the air, so that the gas need not be lighted until the paper is all nearly dry; but on cold, damp days the air of the sensitizing room should be warmed to a gentle temperature an hour or so before commencing the silvering. The economy of allowing the paper to dry spontaneously is very questionable, as so much paper is spoilt by the dead surface resulting; the paper dried quickly and thoroughly giving much finer results on the brilliant and glossy surface of the paper so dried. The paper, thoroughly dry, is ready for

FUMING.

Although fuming may not be advantageous for every description of negative, there is no doubt it adds to the beauty of the print in most cases, giving richness, vigour, and brilliancy, as well as rapidity of working in the printing; makes the toning easier; and gives in the finished print a result pleasing and satisfactory. The box for fuming has been already described; into this the paper is placed, and left under the influence of the fumes of aqua-ammonia for fifteen minutes, a little less time being given in very hot than in cold weather. The fumes of the ammonia impart a slight dampness to the paper, which is an advantage in dry weather; but when the atmosphere is moist it may be well to dry the paper after fuming.

Should the ammoniae have the tendency of slightly discolouring the paper, the addition of a little chloride of lime will remedy it, pouring a few drops in the ammoniae saucer. The paper is then cut, and is ready to be placed in the

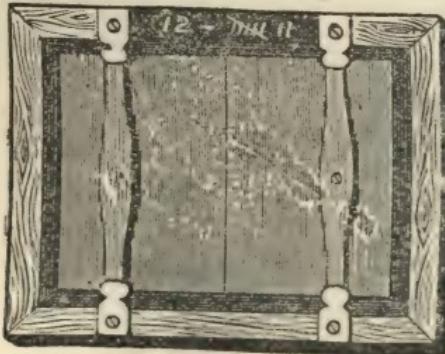
PRINTING FRAMES.

Printing Frames are made of all sizes, to suit the different styles of pictures made. They should be of hard, well-seasoned wood, capable of resisting the influence of all the changes of temperature. For vignettes the bevel in front of the negative should be deeper than in the ordinary frames, to remove the vignetting paper from the print, and thus more effectually diffuse the light, and secure finer results in the gradation of tone. If placed near the negative, the edges of the opaque portions of the vignetting paper will print sharp, unless almost impossible skill and care are exercised. The thickness of bevel necessary in vignetting frames is not only unnecessary in the ordinary plain frame, but a positive disadvantage, as, with an oblique light, a shadow will be cast which may spoil the print. The back of the frame is hinged at the centre, and is kept in its place by a spring over each section of the back, to allow of examination of the progress of the print; but the entire back should fit perfectly into the sides of the frame, with no room for shifting, or there is great danger, in partially opening the frame, that the print may be moved, and thus a double impression be printed. The examination of the prints should be done in the subdued light of the printing-room; but, as experience is gained, and with it the power of seeing rapidly the state of the print, it may be done in the light, but the operator should in all cases turn his back to the sun, and thus expose the print in shadow. I do not think this examination of prints in actinic light is wise, but in the hurry of a large amount of work it may be thought

advisable, and I therefore suggest that great caution is absolutely necessary. The inexperienced printer, at all events, should in all cases take the frames to be looked at into the printing-room. The back-board of the printing frame is covered with cloth, or green baize, and pads of either material interposed between it and the paper in contact with the negative secure even pressure, and, in consequence, sharpness of the print, as well as permitting greater pressure on the negative without danger of its breaking.

TAKING ACCOUNT OF THE PRINTS.

This may either be done by neatly marking the corner of each print, advancing the number each time; thus 12.9 being the last mark, on placing the next print in the frame the record 12.10 is made, indicating that it is the tenth of a series of 12; or in each frame a little slate tablet may be *inlaid*, on which the record of prints may be kept. In the sketch it will be seen that the eighth print is in the frame.



This is certainly the best method of keeping reckoning especially when the printing of an order extends over several days.

CHAPTER XVIII.

PRINTING—MEDALLIONS AND FANCY PRINTING.

THERE is rather more in printing than the mere placing of negative and sensitized paper in the printing frames and seeing how many prints you can "knock off" in a day. Study, thought, and no little ingenuity must aid experience, because the qualities of the negatives made necessarily vary very much, and to treat these all alike would result in a plentiful crop of bad prints at the day's end. It is often necessary for the printer to "doctor the negative," even after it has been retouched; one of the gravest faults of retouchers—after their falsification of art—being, that they very often do not understand the printing qualities of the negative. The printer should study each negative before printing it.

In the background, often, there are streaks and stains that would mar the picture very much if printed out to the size of the card. Sometimes the pencil is powerless to remove these marks, and even the application of retouching colour fails to blot them out. In this case work up as nicely as possible the portion of the background adjacent to the figure, and vignette. Oftentimes, smoking the front or glass side of the negative over a lamp, and re-

moving the deposit from the face, hands, and the denser stains on the background, &c., may improve the negative; but this method requires considerable care and skill. It is needless to advise you not to print from such a negative if you can get a better with another sitting.

The shadows in photography are generally too strong, and not unfrequently, after the negative has passed through the retoucher's hands, the printer has to resort to his dark pencil and Prussian blue. A frowning expression should generally be considerably modified, especially as the scowl is often not habitual to the sitter, but the effect of too strong light, particularly when the mode of lighting which photographers are pleased to call the "Rembrandt" is adopted.

With a dense, "hard" negative the shadows get fully printed, without much detail on the light side. The glaring white may be subdued by being exposed to diffused light through a form cut to the shape of the white portion; or the paper may, with many negatives of this class, be first slightly discoloured by exposure to light before printing; but this shading must be done with judgment, or flatness will be the result. Intense negatives are best printed in direct sunlight, because contrast is subdued by the rapid printing. The paper should be silvered to be less sensitive than for the ordinary work, and thus, in a measure, reduce the contrast. A short floating on a weak bath should be resorted to, and this paper set aside for your intense negatives. Pink tinted paper is also useful, the delicate flesh colour being preferable to the glaring white.

For weak negatives almost the reverse measures advised in the case of intense negatives are resorted to. A lengthened floating of white paper on a strong bath, and an extended time of fuming, and slow printing, are the

general rules to be borne in mind. Of this class of negative we may have many only "thin," but otherwise perfect in gradation of light and shadow; and all we have to do is to reduce the rapidity of printing. To accomplish this, we print in deep shade, and under several thicknesses of tissue paper. Coloured glasses may often be interposed between the negative and the light with good effect. A yellow varnish of one part iodine to one thousand parts of negative varnish is to be recommended for thin negatives. But there is another order of weak negatives, utterly flat and uninteresting, the which to see puts you on very bad terms with the operator whose work it is. To print such negatives a good deal of skill and patience is required. Coating the face and hands and lights with Prussian blue, or, in some cases, Naples yellow, retards the printing of these portions. I have also covered negatives with tissue paper, and worked upon them with pencil and colour—but *I believe this is now a patent process*, though I did it long before Her Majesty's Commissioners covered it by granting letters patent—and, in some cases, by making little masks of tissue-paper, and pasting them on the unvarnished side of the negative, over the face, hands, &c.; this, I believe, you may still do without fear of infringing any patent.

Drapery very often requires some dodging—a wrinkle in a dress often costing a lady as much trouble as one in the face—and many excellent pictures are disliked and rejected by customers on account of a fold marring the appearance of the dress. Folds may be softened or obliterated by the retoucher. Lace can be improved by a few judiciously worked-in lights. The appearance of beads and jewellery also may be improved by the same means. A lady's white drapery may, in many cases, be much enriched by a light artistically worked in along the top and some portion of

the sides of the folds, to supply contrast in what might otherwise be a very monotonous effect. Dark drapery should sometimes be printed beyond the time allowed for the whites, those portions being shaded.

The Hair should be carefully examined to see that no ugly tufts project beyond the head to spoil the outline; and should such exist, they should be carefully worked out, as also straggling hair, &c.

The Face.—See that the retoucher has done his work properly, heavy lines softened, proper gradation of light and shade secured, everything as it should be; and having seen that the negative is in proper condition for printing, it is ours to secure the best results, that the prints are bold and brilliant, and yet soft and full of detail.

FILLING THE PRINTING FRAMES.

As it is one of the easiest things in the world to break a negative in the operation of preparing for printing, *care is necessary*, not in this alone, but in all the manipulations, not only of printing, but of photography. The glasses should be all of the proper size; but should one be too large, never attempt to force it into a frame; or should it be in any way small, prepare a bed for it of another plain glass placed first in the frame. Dust should be brushed from the surfaces of the negative with a camel's hair brush before putting it into the frame, and before each piece of paper is placed in contact. When the paper is in position, hold it up to the light, and see that it is properly adjusted—not too high nor too low. Should there be any flaw in the paper, place it so that it will come in the drapery or shaded part of the picture, and exercise the same thought where there is a water-mark in the piece of paper. Such pieces should never be used for vignettes, for which the very

best pieces should be laid aside. Adjust the pads carefully, taking care not to move the paper.

Keep the pads free from dust.

VIGNETTING

requires considerable care, and calls for no little taste. The vignetting board, or opaque paper in which is cut the form required, is adjusted to the frame by holding it and the negative in the frame up to the light to see that it is properly placed, and moving the vignetter to its proper position. The proper shape for the opening is *oval*, but this must in some cases be modified to suit the negative. As the light in printing under the vignette opening diffuses, it will be found necessary to cut it a little smaller than required in the resulting picture. The opening is covered with tissue paper, and the frame must be placed so that the sun's rays fall perpendicularly on the frame, or, creeping in too much on one side or the other, the print will be uneven. As explained about the frames for this style of printing, the bevel must remove the vignette paper well from the negative to give softness of gradation. The negative, to be printed successfully as a vignette, should be well balanced in the pose of the head and shoulders. The background should be of one tone, and generally lighter than in ordinary portrait work. Should the graduated background or cone have been used, one side being darker than the other, the vignette should be placed nearer that side of the figure; or cause it to print slower (and thus reduce the depth of colour) by adding extra paper on that side.

The "Vignette Grey."—A very beautiful and truly artistic effect is produced by shading the white background of the vignette to a grey tint. The author has

seen very few specimens of it, so that it may commend itself as a novelty ; too often an unworthy quality, but not so in this case. The vignette made, it is placed between two *clean* glasses. Resting on the left hand, the print is exposed to light, the figure and shading of the background protected by a piece of oval cardboard a trifle smaller than the vignette. The glasses are kept gently turning on the left hand, while the forefinger of the right keeps the cardboard oval in motion, so that sharp lines are prevented. The rotary motion of the print is necessary to prevent the shadow cast by the hand having an influence on the print, and the gentle motion of the cardboard precludes the possibility of sharp lines. These simultaneous motions will prove difficult at first, but by beginning practice in very subdued light, sufficient ease and certainty will be acquired to successfully shade in strong sunlight, and the result will fully repay a rather difficult lesson. *The grey background should never be darker than the shading behind the figure of the original vignette.* The same effect may be produced (but not so perfectly) by exposing the print, protected by cotton wool over the printed portion, in subdued and diffused light.

The author has seen some pictures with a black background produced in this way, the lighter tint round the head giving the appearance of a halo of glory : nothing can be in worse taste—it is very dreadful.

PRINTING IN OVAL OR MEDALLION.

The oval and cut-out forms may be procured at the stock dealers of much better shape than the printer can himself make.

The Oval is a very popular form of printing, and by it many pretty effects may be produced. The negative is

first printed with the oval shape opening to the proper depth of tone ; the print is then placed on a sheet of glass, face upwards, and the oval cut-out placed in position over the print. It is, in my idea, better to adjust it a little on one side, whereby a little edge of the print is exposed. A clean glass is now placed over print and oval cut-out, protecting it, and the white margin is slightly discoloured to a grey tint. By this means a fine line of white is seen on the side covered by the oval, and a dark line on the other side where the oval of the print has been exposed a second time, an effect seen in many old oval steel and copper line engravings.

Fancy borders may be made with negatives of fine lines, curves, coarse drawing paper, marbled paper, fancy figuring, &c., in place of the plain glass under which the oval picture was exposed the second time.

The vignette oval is a combination of the vignette and oval—the oval stopping the delicate diffusion of tone to the shape of the opaque form, it may then be delicately shaded as described for ovals.

ARCH-TOP FORMS.

These are cut out by the printer to suit special negatives, or may be procured of the stock dealers. There is scope for a great deal of variety, and they are printed in the same way as the oval forms. Though this fancy printing oftens adds to the beauty of the picture when taste is exercised, it is very dangerous to the printer to whom taste and propriety are strangers. The designs should never be so glaring as to distract the eye and sens~~o~~ and take the attention from the portrait, nor should they be so complicated as to give the idea of a troublesome Chinese puzzle. Do not strive after a *striking effect*.

Arch-top vignettes are a combination of the vignette with arch-shaped borders in grey.

Care should be exercised to preserve the paper and prints from stains and finger marks which are so likely to be communicated to them by a dirty and heedless manipulation. The fingers should be kept free from dust and frequently washed. A coarse towel should be kept handy on which to wipe the hands in warm weather.



CHAPTER XIX.

TONING, WASHING, AND MOUNTING—PRINTING ON PLAIN PAPER.

Washing the prints.—There is a large percentage of silver in the print to which the light has not gained access, and is therefore not reduced, which would be wholly lost were we not to take measures to prevent this waste. It is for this reason that we preserve the changes of water in which the prints are washed. It is better to have two dishes, which must be kept to this use alone; these we partially fill with water. Into the first, the prints are placed one by one, care being taken that they are not stained by the water before being thoroughly and evenly immersed. To accomplish this properly, take the dry prints in the right hand, and drop them one by one on to the surface of the water, and with the left hand immediately submerge them; this is safer than picking each print off with the wet fingers, as water spots are likely to drop on the others and so stain them, the water causing red spots which are not got rid of without difficulty. After the prints have been turned and moved about in this water for a few minutes, they are placed in the second dish; the water of the first poured into a tub for reduction, and the dish filled up with clean water. The prints are thus washed in four or five

changes of water, all of which are preserved. To the last change of water enough salt is added to make it taste saltish. This will give the prints a cherry-red hue. They may then be washed in clear water, and are ready for toning.

When the prints are all washed, a handful of salt is thrown into the tub in which the washings have been preserved, and thoroughly stirred, the effect being that the free nitrate dissolved in the water will combine with the chloride of sodium (or common salt), and precipitate as chloride of silver by the morning. Too great addition of chloride of sodium will cause it to settle very slowly. When the water is clear (to test which, draw off a tumbler full, and add a little salt; if no milkiness can be detected, the silver has all been thrown down), it may be carefully drawn off, leaving the precipitate undisturbed at the bottom.

THE TONING BATH.

Toning is a reduction of metallic gold on the prints; the chlorine previously in combination with the gold, uniting with the silver in the print, produces protochloride of silver (this bleaches the print, and therefore allowance is made for this, and for the effect of the fixing towards reducing the tone of the print; it is printed about one-third darker than we desire in the resulting picture), and the metallic gold, being set free, deposits itself on the silver.

If a solution of chloride of gold is made alkaline by the addition of bicarbonate of soda, decomposition sets in, it being no longer restrained by the acid, and for this reason the stock solution of gold is kept slightly acid.

The substances used to accelerate the reduction of gold in the toning bath are various, such as the acetate, carbon-

ate, chloride, phosphate, &c., of soda; but their influence is on the reduction of the gold, not on the tone of the print, they being added to accelerate the action of the gold only, as in its acid state it would precipitate too slowly.

There are a great number of good formulæ for toning baths, almost every printer having a favourite preparation, but the subjoined is a thoroughly reliable one:—

Pure water...	...	...	...	64 ounces.
Acetate of soda	...	...	...	120 grains.
Gold (neutral)	...	...	...	15 "

* This bath may be used again and again, being simply strengthened before each toning with the chloride of gold solution kept in stock.

Pure water ...	...	...	...	15 ounces.
Chloride of gold	...	...	...	15 grains.

the quantity varying according to the number of prints to be toned—say half a grain of gold (or half ounce of solution) to each sheet of paper to be toned. The bath should be thus strengthened in the morning ready for use at the day's end, that the gold may precipitate the more readily. The toning bath, having been used, may be poured back into a bottle, and allowed to settle, the clear bath being decanted when set out for use, and the precipitate put aside.

TONING.

The prints, after being thoroughly washed, are placed one by one in the toning bath. To do this without staining them (as would result if they are touched with fingers on which are traces of the toning solution), take them separately from the dish of clean water in which they lie, after washing, with the right hand, and drop them upon the toning bath; and, with the left hand, gently and

quickly submerge them, to prevent unequal action of the toning bath. They must be kept in constant motion, to insure even toning. The light by which you tone should be shaded, that it falls on the prints, and not in your eyes.

To treat this manipulation exhaustively would require much more space than I can command here; for though a safe rule to follow is, that toning should be conducted till the prints have the appearance you desire them to have when finished, it would be necessary still to explain what that appearance should be in the different prints. All pictures do not require the same tone. For instance, to tone the portrait of a blonde to a black tint would be hardly satisfactory; nor would a brunette be suitably represented by the red, however fond you might be of that tone.

I do not wish you to have the idea that I suggest it is possible to reproduce nature in this respect, but only desire to point out these two extremes to prove that modification of tone is necessary. Thought must be exercised in this.

Weak prints should be toned face upwards in a weak toning bath; and hard, intense prints in a strong bath, face downwards. The effect of toning the prints face upwards is to make the operation slower, and turning them face downwards to accelerate the action of the bath.

The chocolate tone is produced by toning a little longer than for the red; a decided brown by toning beyond the chocolate; and a purple tone is produced between the chocolate and the brown, continuing the toning until the print shows the slightest possible sign of the tone, when it should be removed from the toning bath.

The blue tone is not generally admired, a pleasant tint of that colour not being easy to produce unless the

negatives have very excellent printing and toning qualities. The black is produced by toning full strong. The prints, as they are toned, are placed in a dish containing clean water, which stops the toning ; and, all being toned, the bath is put away and the prints are placed in the

FIXING BATH.

Great caution must be exercised that the prints, in being placed in the fixing bath, are not spotted with the solution, or imperfectly immersed. The same precautions should be taken as those already advised against staining with water, *but, if possible, to a greater degree.*

The fixing bath is composed of :—

Water	...	...	...	...	10 ounces.
Hypsulphite of soda	...	...	2	"	

with about one grain of bicarbonate of soda to the ounce of solution to neutralize any free acid that may exist, acidity having the tendency to decompose the hyposulphite and liberate sulphur, which, as sulphide of silver, is thrown down on the prints in a black deposit, and materially affects the tone. The fixing solution should be fresh every day, and the dish used for this purpose alone. In the winter this solution may be made lukewarm, the action of the cold bath being very slow. Keep the prints in constant motion, and take care that they do not adhere to one another, or imperfect fixation is the result. Ten minutes will be about the proper time for fixing ; but if, on holding the prints up to the light, they present a mottled appearance in the shadows, they are not sufficiently fixed.

Properly fixed, the prints are clear and transparent in the shadows. It is well to place them in water containing salt in the proportion of a handful to the gallon of water.

This displaces the hyposulphite to a great extent, and is a preventive of blistering.

THE WASHING OF THE PRINTS

should be very thorough, several changes being made, and finally placed in the washing apparatus, they may be allowed to wash all night.

CUTTING AND MOUNTING.

When thoroughly washed, they must be dried if they have not been cut previously to the toning. This is, I think, the best plan, but by many it is objected to on the ground that the toning and washing frays the edges of the prints. I have seen thousands of prints treated in this way that were perfect when finished, and with not so many torn and spoiled prints as when toned in the rough.

If they are to be cut afterwards, they must be dried in a blotting-book. The print is placed on a sheet of glass under a glass form of the size required, and cut with a knife.

The prints should be placed in their respective sizes in heaps, and pasted over evenly and cleanly with starch, paste, or gum.

Starch is by far the best for mounting prints, being clean, reliable, and strongly adhesive. It is made by moistening pure starch with water, and mixing it until it becomes a thick paste; *boiling water* is then poured rapidly and steadily upon it, the starch being stirred all the while, until, after thinning, it gets thick again. The result, if it has been properly made, is a smooth, soft paste. The best white starch should be used.

Pasting.—Care must be taken, in pasting and mounting, that none of the starch is smeared over the prints or mounts. Placing the print on the mount in its

proper position, it is rubbed down by the hand, a clean piece of paper being placed between the print and the hand.

Mounting.—See that there are no hairs or lumps under the print before you fix it in position, and guard against dust contaminating the mounts. A great deal of difference in the effect of the picture may be made in the position of the head in the cut picture, too great margin left at the top of the head giving a stunted appearance to the figure, and *vice versa*. So, too, in unequal cutting of the sides, the picture being cut with the figure forward, gives it the appearance of a person desirous of walking off the card, or with too much margin in front, the idea of your customer being anxious to gracefully (?) back out of it. When dry, the prints may be burnished, spotted out, and finished.

PRINTING ON PLAIN PAPER.

Prints on plain paper surpass in artistic qualities those on the albumenized surface ; indeed, there is, and ever will be, no doubt, fault found with the highly polished surface of the albumen print, as being fatal to an artistic production. It will, perhaps, hardly repay us to enter into the discussion, either as protestants against hypercriticism on the part of artists, or to find fault with a process the beauty of which all must admit, and one, moreover, which has obtained such universal admiration and patronage.

Prints on plain paper have their special use, however, as mediums for the reception of colour, chalk, and Indian ink.

To Salt Plain Paper.—In a large, wide-mouth bottle dissolve three hundred grains of chloride of ammonium in fifty ounces of pure water, to which are added one hundred grains of gelatine, previously dissolved in a little water by

means of heat. This should be thoroughly mixed and filtered, when it is ready for use. The paper may either be floated on or drawn through this solution. If floated, select the side of the paper having the finest grain, and proceed as in sensitizing albumenized paper, floating ten seconds. The paper should be marked with the pencil on the reverse side as a guide in subsequent manipulations.

To draw the paper through the solution, take the paper by two corners, and let the sheet hang over the edge of the bath farthest from you (outside), the bath being placed on a high stool or small table. Now draw the edge of the sheet held by the fingers under the solution steadily and slowly, care being taken that all parts are wetted thoroughly. When the sheet is all drawn through, hold the sheet over the bath to allow it to drain, and then hang it up in a warm room to dry. Guard against the formation of air-bubbles. Do not use the clips to hang it by which have previously held the sensitised sheets.

The bath should be filtered after use, and kept in a clean bottle ready for the next salting.

The sensitizing bath is similar to that for silvering albumenized paper, the plain nitrate of silver bath, forty or fifty grains strong, giving the best results; but it is advised that a separate one be kept for plain paper. The paper has been marked with pencil on the unsalted side, and this side is upwards, the other—the salted side—being in contact with the sensitizing solution. Float about the same time as in the case of albumen paper. Dry thoroughly, and fume ten minutes. Then proceed as in ordinary printing.

Plain paper prints, being generally large, should be treated very gently in the washings, and, to ensure good results, it is well to treat them separately.

ADDITIONAL.

CHAPTER XX.

DEFECTS IN THE NEGATIVE—(FAILURES IN THE MANIPULATIONS FROM GLASS CLEANING TO RETOUCHING THE NEGATIVE).

(a.) Failure is sure to ensue on collodionizing unclean glass. If the plate has been polished, and not albumenized, the dirty surface may sometimes be detected, when by breathing on it the breath adheres unevenly to its surface. Generally it does not show itself until after development.

(1.) *A slipping off of the film* under the jet of water in washing the negative shows that you have flowed the collodion on the unalbumenized surface, or that the glass is greasy. For greasy glass, place it in the potash dish for a few hours, wash thoroughly under the tap, and albumenize. To guard against collodionizing the wrong side of the glass, stack them on an uniform plan.

(2.) *Glossy precipitate of a silver tint* appearing between the surface of the glass and the collodion film is another evidence of insufficient cleaning, especially where old glass, which has before been used, has not been left long enough in the concentrated potash solution. This appearance is especially noticeable from the back of the negative. Return the plate to the potash, or, which is safer, discard it.

(3.) *Spots of moss-like formation*, proceeding especially from the lower edge, arise from the dirty state of the plate-holder. The holder should be thoroughly cleaned, and coated with shellac or asphaltum, or, if this is not necessary, tallow rubbed round may suffice.

(4.) *Dirty edges*, and spots proceeding therefrom, are caused by resting the plate on a dirty substance ; perhaps the rack in which they drained after being albumenized, a dirty shelf, or drainage on an old piece of blotting-paper after sensitizing, or perhaps in handling the plate *with dirty fingers*—which ?

(5.) *Irregular bright spots and short lines* are caused by dust and fibre falling on the plate in the plate-holder.

(b.) Failures in collodionizing the plates are very numerous, and generally the effect of carelessness.

(1.) *A transparent, insensitive margin*, manifesting itself after the plate has left the sensitizing bath, evidences that the collodion film has been allowed to dry too much before immersion in the bath.

(2.) *Rottenness of film* is caused by the collodion not having been allowed sufficient time to “set” before being placed in the bath.

(3.) *Inequality of thickness of the film* shows that the manipulation of coating is faulty.

(4.) *Spots emanating from the corner* by which the plate was held is the punishment for not having clean fingers.

(5.) *Insensitive spots in the middle of the plate*, of round form and answering to the tips of the fingers spread under the plate in flowing it with collodion, are the natural consequences of an improper method of holding the plate, the warmth of the fingers causing a more rapid evaporation at these points, and insensitiveness of the film is the result.

(If the plate is so large and heavy as to necessitate this mode of handling, a stout piece of cardboard placed between the plate and the fingers will overcome the difficulty.)

(6.) *Diagonal streaks* in the direction of the corner whence the collodion has been flowed back into the bottle prove that the plate has not been properly rocked to secure evenness of film.

(7.) *Air-bubbles* appear as little holes with thick and thin tails, or as lumps with the same marking of the course they have taken over the film. They are caused very often by holding the collodion bottle, in pouring, too high above the plate, or from agitation of the collodion before pouring.

(8.) *Irregular black spots* are caused by dirt from the neck of the collodion bottle.

(9.) *Comets* sometimes make their appearance when the collodion is freshly iodized, and has not been allowed to settle.

(10.) *White and black lines* also are sometimes an evidence that the collodion is not sufficiently settled, especially in a potassium collodion. Remedy: filter, or allow the collodion to settle perfectly.

(11.) *Shingle marks* are apt to appear in very cold weather, or when there is water in the collodion.

(12.) *Slipping of the film*.—Old or bad sample of gun-cotton used in making up the collodion. (NOTE.—Be sure, before rejecting the collodion, that the fault is not of your glass or bath.)

(13.) *Veils* are caused by an alkaline collodion, and may be remedied by the addition of a few drops of tincture of iodine.

(14.) *A honeycombed structure* of the film denotes that the collodion is too tough.

(15.) *Insensitiveness of the film* is consequent on using collodion of too great age. Put it aside to mix with that of new preparation.

Numerous defects are caused by using the pouring bottle for the reception of drainings from the plates.

(c.) Failures in sensitizing the plate.

(1.) *Horizontal lines*, known as hesitation marks, show that the dip of the plate has been arrested.

(2.) *Perpendicular lines* are sometimes caused by too rapid dipping of the plate.

(3.) *Splashes* are consequent on too sudden immersion of the plate, causing the solution to splash upwards over the film.

(4.) *Black streaks*, springing from the portion of the plate which has been in contact with the dipper, arise from dirt on the dipper.

(5.) *Spear, cross, or sword-like markings* are caused when the bath contains acetate or sulphide of silver.

(6.) *Pinholes* are caused by an over-iodized bath. Dilute, filter, and strengthen.

(7.) *Fogging or a veiling of the plate* betokens an alkaline bath or the presence of organic matter. Make slightly acid by addition of nitric acid.

(8.) *Lack of sensitiveness* is met with in sensitizing in an over acid bath, or one containing organic matter. Remedy: neutralize, boil, and filter, and add just sufficient acid to prevent fogging.

(9.) *Grey spots* are caused by the scum that rises to the surface of the bath ; this may be removed by skimming with blotting-paper, but more effectually, if very bad, by treatment as a disorganized bath.

(10.) *The film being partly eaten away* indicates that the bath contains little or no iodide.

(11.) *Streaks in the direction of the dip* sometimes arise from the plate being withdrawn from the bath before it is sufficiently sensitized.

(12.) *Spots resembling pinholes* arise from dust in the bath, agitated by the dipping of the plates and settling on the films.

(13.) *Transparent and pale films* of indifferent sensitivity are the effect of the bath solution being at too high or too low a temperature. Remedy: regulate the temperature of the dark room.

(14.) *Weak pictures* are not infrequently due to a worn-out bath.

(d.) Failures in "exposure" of the negative.

(1.) *Want of sharpness*, caused by faulty focussing or the movement of the sitter out of focus before the exposure of the plate.

(2.) *Double outlines, or "blurring."*—Movement of the sitter during the exposure. Don't get angry.

(3.) *Harshness*, and exaggeration of light and shadows, are due to insufficient exposure.

(4.) *Flatness and lack of brilliancy* in the shadows are caused by over-exposure.

(5.) *Marbled drying spots* are often due to the above cause, or from the plate having stood too long before being exposed.

(6.) *Foggy spots* are caused by reflection: look to this in copying drawings or paintings; the illumination is at fault.

(7.) *Fog* is produced by strong light shining into the lens. Remedy: protect it with a hood.

(8.) *Double pictures* are sometimes caused by small holes in the front of the camera.

(9.) *The picture is out of focus* in consequence of the

ground glass being out of place; especially is this likely to happen when the ground glass is hinged and swings back.

(10.) *Unequal illumination* is sometimes caused by inequality in the thickness of the film; with double lenses, probably, from their unequal power.

(e.) Failures in development.

(1.) *A bright spot* at the place where the developer has been poured on, and lines shooting therefrom, evidence that the developer has been poured on too violently.

(2.) *Curved lines* are formed when the developer is not flowed evenly over the entire plate, each stoppage of the flow of the developer over the collodion surface being registered by a mark of the edge of the solution.

(3.) *The developer "crawls," i.e.,* does not flow evenly over the plate, but is repelled, as would be water on a greasy plate; this is generally caused by an excess of alcohol in the bath, and an insufficient amount in the developer to overcome the tendency to crawl. Too much alcohol in the developer will sometimes cause the same defect.

(4.) *Fogs* are often caused by too great strength of developer, or an insufficiency of acid in the developer, and also by developer that has not sufficient strength and energy.

(5.) *Flatness and lack of contrast* is the effect of over-development, and, as conducing to it, the use of too strong a developer.

(6.) *Harshness and want of detail* follow where the development has been prematurely arrested, or an inactive developer has been used.

(7.) *Failure* is often attributable to a "swilling" of the plate with a large volume of developer, whereby all the silver floating about in a free state is washed away into

the sink and lost to the picture. This fault of development is mainly attributable to nervousness in the operator, that he cannot get the plate covered without developing streaks, and he thus rushes into an equally grave source of failure, until the fault " degenerates into a habit."

(f.) Failures in intensification.

(1.) *Stains* are caused by unequal intensification. If the plate is first flowed with pyrogallic acid before the silver is added, these stains cannot arise.

(2.) *Spots*, particularly when intensifying with iron and silver, are caused by insufficiency of alcohol—sometimes from an excess.

(3.) *A grey granular precipitate* is formed when, intensifying with iron, it has been carried on after the solution has become "muddy."

(4.) *Bluish precipitate* in the shadows is caused by want of acid in the intensifier, and where an old pyrogallic solution is used.

(5.) *Thick and heavy spots* are caused by continued pouring on of the intensifier at one spot.

(g.) Failures in fixing.

(1.) *Bluish or greenish colour of plates* is due to traces of the developer left on the plate, which, with cyanide of potassium, forms a green or blue precipitate. Wash the plate thoroughly before fixing.

(2.) *A greenish deposit in the shadows* shows imperfect dissolution of the iodide of silver. Remedy: longer time in the solution, or greater strength of solution.

(3.) *Thin spots* are caused by cyanide of potassium, where it has been allowed to eat into the film.

(4.) *Black streaks* are caused by insufficient fixation.

(h.) Failures in varnishing.

(1.) *A dull surface* is caused by too thin a varnish, or where the plate has not been sufficiently warmed.

(2.) *Streakiness* is due to the plate being too hot when varnished, or unequal rocking during the setting of the varnish film.

(3.) *Breakage of the glass* is often due to unequal heating or sudden change of temperature.

(4.) *Detachment of the film* is sometimes caused by too great strength of the alcohol in the varnish.

(5.) *The film peels off* under the drying process. This is experienced especially when the negative has been much intensified. (Such plates should be flowed with a dilute solution of

Gum—office mucilage	...	...	25 parts
Water	...	...	75 "

before drying.)

(i.) Failures in retouching.

(1.) *Scratches* in the film are caused by removing the gloss to make a surface for the pencil before the varnish dry; also by coarse particles in the pumice powder, or too rough handling.

(2.) *White spots* on the skin are the effect of unskilful stippling.

(3.) *Ivory-like texture* and want of character in the face, and numberless grave faults, are the results of retouching, done *not wisely*, but too well.

Unnatural lights, characteristic lines, and marks worked out, &c., *ad lib.*, too often seen in unskilful work, prove that retouching is the work only of the artist.

CHAPTER XXI.

DEFECTS IN THE PRINT—CAUSES OF FAILURE IN THE PRINTING OR POSITIVE PROCESS.

(a) SOMETIMES there is cause for complaint, though not so often as photographers would wish to believe, in the commercial albumenized paper. These faults may generally be detected on examination of the paper.

(1) *Unequal albumenizing* will be shown by the prints made on different parts of the same sheets exposed under one negative, some being brilliant where the albumen is thickest, and others, from the thinner albumen surface, being dull and lustreless.

(2) *Dry and horny paper* should be kept in a cool, damp place, and not exposed to warmth before sensitizing.

(3) *Tear drops* are often the evidences of above fault. To save the paper on which they appear, blot them off. Drawing the paper over the glass rod fixed to the sensitizing dish will, in a measure, remedy it.

(4) *Albumen spots and streaks* are caused by carelessness in albumenizing the paper, the spots being spattered on the sheet while drying, and the streaks marking the course of little rills running down the paper in drying.

(5) *Metallic spots* are sometimes caused in the drying-room of the albumenizer, and as often in that of the printer, from the rust of the stove, &c., a slight speck of iron rust spreading considerably.

(b) Failures in the bath and in sensitizing the paper.

(1) *White spots on the paper* indicate the presence of air-bubbles on the bath under the paper. Lift up the corners of the paper when on the bath, and break the bubbles with a glass rod.

(2) *The solution adheres in drops*—the “tear drops” mentioned above. These should be blotted up with clean blotting-paper. Keep the albumenized paper in a cool place.

(3) *The paper repels the bath* because the albumen is too dry—perhaps the effect of hot weather, and not the fault of the paper. Keep it in a cool room.

(4) *Greyish scum on the paper* is taken up from the bath. It may be seen on the surface of the bath before silvering, and should be removed by drawing blotting-paper over its surface, or by filtration.

(5) *Rapid discoloration of the paper*; generally caused by too long floating on the bath.

(6) *Sunk-in, dull appearance of prints*, from the same cause.

(7) *Bronzing of the shadows*; also the effect of too long silvering.

(8) *Weak, flat pictures*, without boldness and relief—the effect of too short silvering, or an impoverished bath.

(9) *Red spots and red printing*, often from the same causes. Sometimes, however, this, and the previous failure of weakness, may be caused by not properly drying before and after fuming.

(10) *“Greasiness” of paper after silvering*; either from

being too dry before floating, or not sensitized long enough. Perhaps the bath is too cold.

(11) *Paper on the bath curls back* because it is too dry. Gently breathe on it until it flattens, and see that the other sheets are kept in a cool place before silvering.

(12) *Inequality of prints* is caused by uneven silvering.

(13) *Stains on the paper* after silvering, and during the drying, come from dirty places against which the damp paper has been brushed.

(14) *Dark stains on the back of the paper* show where the solution has run over the paper.

(15) *The bath turns brown.* This may be remedied by the addition of permanganate of potash, exposure to light, and filtration. It is caused by the dissolution of the albumen from the surface of the paper. Test your bath, and you will probably find it very weak. Strengthen it.

(c) Failures in drying the paper.

(1) *The paper curls.* Weight it down as described in chapter xvii.

(2) *Tear drops show in the drying.* Blot them up with bibulous paper.

(3) *Stains*, similar to No. 14, above, are caused by the sheets swinging together under the influence of draught.

(4) *Numerous failures* are caused by imperfect drying, as weakness and inequality in printing ; and, when the paper is damp, danger of its sticking to the negative.

(d) Failures in fuming.

(1) *Insufficient fuming*, either from weakness of the ammoniæ, or short time of fuming. Red, flat, and weak prints are the result.

(2) *Over-fuming* produces prints blue and cold, and sometimes with a metallic appearance.

(3) *Unequal fuming* and unequal prints go together.

(e) Failures in cutting the paper for printing.

(1) *Waste and bad cutting*, the result of carelessness or ignorance.

(2) *Stains and dirty paper*. Caused by dirty fingers, paper-knife, or shears; or from laying the paper on a dirty place, table, drawers, frames, &c.

(f) Failures in printing.

(1) *Breakage of the negative*. Generally carelessness. Sometimes from warped frames (discard such), flaws in the glass, bad cutting, curvature in the negative, &c., &c.

(2) *Little white spots in the print* are caused by dust between the negative and the paper. Brush the negative on putting into the frame each piece of paper.

(3) *Blurred prints* are caused by unequal contact; perhaps in using too large a piece of paper for the frame, or, generally, by insufficient pressure.

(4) *Double outline*. Carelessness in opening the frame for examination of the print, and in closing it after, causing the shifting of the print. Perhaps the frame is not firm, or has been imperfectly closed.

(5) *Unequal sharpness of the print* is the result of not placing the back of the frame in position, or from the inequality of the pad.

(6) *Unevenly-printed shadows*. Generally caused by printing negatives much retouched in the shadows, in too strong light.

(7) *Harsh vignetting*. From inexperienced cutting of the form, or fixing it too near the negative. Too strong light in which it is printed often causes the defect.

(8) *Ill-shaped vignettes*. From ill-shaped forms, or from the light creeping in on one side.

(9) *Badly-shaped medallions*. Perhaps the cut-outs and masks are badly cut, or, most likely, improperly used.

Carelessness in handling the forms; they are often torn and worn out of shape.

(10) *Ugly fancy printing.* The result of want of taste. Keep to plain printing.

(11) *Failure in greying the vignette.* Too strong light and want of skill or judgment. The grey should never be darker than the vignetted background of the original print. Do not attempt the "in memoriam" effect of getting a black background with a light halo round the head. Nothing can be worse—even as a novelty.

(12) *With printed-in backgrounds* the dangers are numerous, and failure easy. Moving the background out of position, the injudiciousness of choice, too great sharpness, and printing over the figure, are a few of the faults in a manipulation that requires great care, skill, and taste.

(13) *Finger-marks on the print.* From touching it with soiled fingers.

(14) *Weak lights* are often caused by examining the prints too often during printing, or in too strong light.

(g) Failures in washing the prints before toning.

(1) *Stains* from water splashes while placing them in the washing dish.

(2) *Imperfect washing*, in allowing them to stick together, and not keeping them in motion.

(h) Failures in toning.

(1) *Too rapid action of the toning bath* is caused by too great addition of chloride of gold. To this may be laid several faults, as—

(2) *Over-toning*, the action of the bath being so rapid that the toning cannot be checked at the right time. This fault may also, of course, be due to inexperience or unwatchfulness.

(3) *Uneven toning* is another result of using too strong a bath. Generally, however, it is caused by the prints being allowed to stick together while in the toning bath—the prints should be kept in constant motion, to allow of the solution gaining access equally to all parts of the prints—and, not unfrequently, from a bad habit, indulged in by some printers, of strengthening the bath during the operation of toning.

(4) *Weakness of tone* may arise from the bath being too strong, or the prints being originally weak, the strength of the toning bath increasing the defect.

(5) *Mechanical or inartistic toning* evidences a want of care or thought on the part of the operator. A batch of prints diverse in style and quality, some requiring special treatment, are all toned alike, and therefore faultily, however good and even the tone may be in itself.

(6) *The prints refuse to tone.* Several causes lead to this result. The paper sensitized on a bath manufactured from an old negative bath in which there is much iodide of silver, acid, or foreign substances will often quite fail in the toning.

(6a) The water of the toning bath is contaminated with sulphur, or perhaps the dish is not clean.

(6b) Gold solution is wanting.

(6c) The solution is too cold.

(i) Failures in fixing.

(1) *Stains and streaks* in the prints are formed when they are not immersed equally in the solution.

(2) *Spots and splashes of hypo, and finger stains,* in placing them in the fixing dish, should be guarded against. If you cannot safely accomplish it alone, an assistant should drop the prints on the dish while you place them under solution, and keep them in motion.

(3) *Yellow spots*, which may not appear until the prints are finished, are from air-bubbles, which prevent the action of the hyposulphite of soda. Constant agitation of the prints in the bath will effectually break up these bubbles.

(4) *The prints turn yellow*. Cause: an old fixing bath.

(5) *Cloudiness of the prints*, markings which afterwards turn yellow: caused by imperfect fixation. The prints were in the bath too short a time, or not enough solution was used.

(j) Failures in washing after fixing.

(1) *The prints spot and blister* on being placed in water. To avoid this, gradually reduce the strength of the soda solution—when the prints are all fixed—until it is almost free from soda, that the change to the prints may not be so rapid; then wash in water, and so on, as directed for washing the prints.

(2) *The prints turn yellow* in consequence of traces of soda being left in them, either because they stick together in washing, or from

(3) *Insufficient washing*, the principal cause of fading in photographs. Keep the prints separated.

(k) Failures in finishing.

(1) *Yellow spots* are sometimes caused by using old blotting-pads in which are traces of hyposulphite of soda.

(2) *Spots are also caused* by using mounts containing traces of soda or sulphur.

(3) *Stains* appear when old, sour starch has been used for mounting.

(4) *Spots and stains* often result from placing together a number of damp mounted pictures.

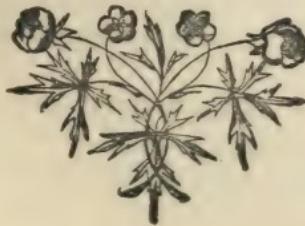
(5) *In cutting the print*, too great margin at the top gives a stunted appearance to the figure, while

(6) *Too little margin at the top* has the effect of lengthening the figure.

(7) *The print cut too near one side or the other* produces in one case the effect of the figure *walking off* the print, and in the other the appearance of *backing out*.

(8) *Ridges in rolling the prints*, scratches from dust in the roller, breaking the edges of the card, marks of stoppage, &c., may all be avoided by care.

(9) *Numerous defects in spotting out the prints* are to be avoided.



CHAPTER XXII.

THE FERROTYPE.

THIS style of picture has its admirers ; and, from the fact that it may be finished and delivered to the customer within a few minutes of sitting, it has advantages of its own. The picture is a collodion positive made on a black or chocolate varnished iron plate, the colour of the plate giving the gradation of shadow as seen through the transparent parts of the collodion film, the opaque portions of which make the lights.

Collodion.—Most of the ordinary portrait collodions will serve for this positive, except one in which potassium enters, that iodide giving too much transparency. A good collodion for ferrotypes may be made up as follows :—

Iodide of ammonium	...	...	35 grains.
Iodide of cadmium	...	...	25 "
Bromide of cadmium	...	...	25 "
Alcohol and ether (each)	...	...	5 ounces.
Gun-cotton (to the ounce of plain collodion)	...	...	6 to 8 grains.

This may be used as soon as it is settled sufficiently clear.

The bath should be forty or forty-five grains of nitrate of silver to the ounce of pure water, slightly acid and iodized as the negative bath. No practice can be more productive of bad results than promiscuously using this or the negative bath for iron and glass plates. Each bath should be kept to its respective use. The ferrotype bath can be rectified in the same manner as advised in the case of the disordered negative bath.

Coating the ferrotype plate is an operation exactly similar to coating a glass with collodion, though a little difficulty may at first be experienced in holding the limp and yielding iron-plate; but with practice this is soon overcome. When the film is set it is placed on the dipper, and

Immersed in the bath, the time of sensitizing being judged in the same way as with the negative. It is then

Placed in the carrier (of somewhat different construction to the negative holder), a sheet of glass placed at the back to keep it firmly in its place, and then taken to the camera, and the exposure or exposures made.

The ferrotype camera is generally constructed with a movable back, by means of which four, eight, or sixteen exposures are made on one plate.

Exposure.—This is much quicker than for a negative; speaking roughly, one half the time only being requisite.

The development.—This manipulation requires considerable skill in determining the proper moment at which to stop the development. When this knowledge is acquired it is really easy, as, with the backing of varnish, the progress of this development is more easily watched than with the negative as seen under such varying conditions of transmitted light. The development of the ferrotype is not continued after the first appearance of detail; it is, judging by the standard of the negative, only half developed.

DEVELOPER.

Protosulphate of iron	...	...	1 ounce.
Acetic acid ...	...	...	1 "
Water	...	...	16 ounces.
Alcohol (as required).			

It is well to develop over a large filter and funnel, to catch and preserve the silver; or an old felt hat may be found useful for catching this rich waste.

Fixing.—After being thoroughly washed, to remove all traces of the iron, the ferrotype is placed in a dipping bath of cyanide of potassium. The plate must be carefully watched to see that the cyanide does not eat away the lights of the delicate film; the perfect clearing of the shadows being all that is required. It is now washed thoroughly.

The ferrotype should present purity of lights, with a good gradation of half tones and shadow to the deepest shadows, which should be clear and bright, any veiling or fogging showing that the exposure was too long—of which you can judge by the rapidity of development—or the action of the developer too extended. It can now be dried and tinted.

Drying, tinting, and varnishing.—The ferrotype is now placed on a drying stove, and, when perfectly dry, the cheeks and lips of the picture are tinted with a dry flesh colour lightly brushed on with a soft camel's hair pencil, and dusted off with a blender. Great care must be taken, or the delicate collodion film will be scratched. The picture is now varnished with a clear alcohol varnish, and dried to a glossy surface. Trimmed round the edges, it is placed in a ferrotype envelope, finished.

Ferrotypes may be coloured in water-colour if, before

drying, the yare flowed with a weak solution of gum-water, and on this protective film the tinting can be done.

Vignette ferrotypes can be made by interposing a white semi-oval form with serrated edges between the sitter and the lens at such a distance from the lens that it is *entirely out of focus*, the toothed edges giving additional softness.

In a sheet of white cardboard, about the width of a man's shoulders, cut out a section of a circle and notch it. This



is placed in a frame, which allows of its being fixed at any required angle, the frame being placed in a head-rest base, in which it may be moved up and down as occasion may require.

If a vignette is made on a dark background, the vignette board must be so arranged as to be in shadow, to correspond with the depth of tint of the background.

This may be done by turning the vignette board away from the light, if it does not interfere with the *shape* of the

vignetting, to make it uneven; or, by turning the serrated edges of the board *towards the camera*, the usual position with a white background being with the edges *away from* the camera. With a little practice any shade can be obtained with the vignetter. The grey vignettes are always to be preferred.

Medallion ferrotypes may be made by means of an oval, cut in a large piece of grey cardboard fixed on a stand.



This is placed close to the sitter *and in sharp focus*. One edge of the oval may have a white line marked upon it, and the other edge a dark line, similar to that formed in the printing of the medallion.

CHAPTER XXIII.

TRANSPARENT POSITIVES—THE REDUCTION OF GOLD AND SILVER WASTES—WEIGHTS AND MEASURES, ETC.

TRANSPARENT positives can be made (1) by the copying camera, (2) by printing on dry plates, and (3) by the collodio-chloride process ; but as, by the second and third processes, we are restricted to reproductions of the same size, the first proves the most useful, enlargement and reduction being possible.

To make transparent positives in the camera.—Our first requirement is a camera which will give great length for focussing. I have used an arrangement which will, I think commend itself to all as simple and efficacious :—A long tunnel box, blackened inside, and fitted with grooves for the reception of the camera. At one end the camera is inserted in the grooves, and across the other end of the box a board with an opening for the negative is fixed. The focus can be adjusted, first, by the movement of the camera in the box towards or from the negative from which the positive is to be made ; and secondly, and with proper exactness, by means of the focussing arrangement of the camera inside the box.

This box can be adjusted to any angle at an open window, by means of movable legs fitted underneath the box, and will rest on a table or camera-stand.

The negatives from which it is intended to make transparent positives should be specially prepared for that purpose, thin, full of detail, very sharp, and without trace of fog, and should not be varnished.

The exposure of the transparency should be double the time ordinarily given, and the developer made up with an excess of acetic acid. Fix with cyanide.

THE REDUCTION OF GOLD AND SILVER RESIDUES.

The recovery of gold from the toning bath waste.—The water having been drawn off from the solution, dry the purplish black deposit (which consists of metallic gold and iron), and expose it in an iron vessel to a bright red heat, whereby the iron of the deposit is changed to the sesquioxide. When cold the powder will appear dark red. This is placed in an evaporating dish, and hydrochloric acid is added. Care must be taken that the acid contains no *free chlorine*; to test which, place in it a piece of pure leaf gold, which should be unaffected. If it dissolves, the acid must not be used for our purpose.

The mixture is now gently heated, being stirred the while. The iron will immediately commence to dissolve, and when the seething has ceased, dilute the mixture with water, and filter. Wash the remaining black powder in ten or twelve changes of water, and the result is pure metallic gold.

Reduction of chloride of silver.—The flux, a mixture of carbonate of potash 8 parts, and resin 1 part, is added to double its weight of the chloride of silver in the finely-powdered state, and packed into a Hessian crucible until

it is about three parts full : upon the surface strew a thin layer of salt. The crucible is now put in a very hot furnace, and kept at a white heat for half an hour, when the mass, which has frothed violently, will have become calm. Allow the crucible to cool, when it may be broken, and the silver will be found at the bottom in a lump.

Reduction of paper wastes.—The flux, composed of carbonate of potash 12 parts, carbonate of soda 3 parts, and salt 1 part, is mixed with the ashes of the paper cuttings, and fused as described for chloride of silver. If the flux becomes stiff and thick during the operation, throw into the crucible a lump of nitrate of potash about the size of a marble. By so doing some of the impurities are burned out.

Reduction of sulphide of silver.—First “roast” in an open iron pan over a fire, until it reaches a red heat, and is fused into a smooth even mass; now mix 14 parts of the sulphide to 16 parts of a flux composed of carbonate of potash 3 parts, and carbonate of soda 2 parts. Half fill the crucible with the sulphide and flux finely powdered, and expose to a red heat.

The reduction of developer waste.—The dried black mass is mixed with flux made as follows: carbonate of potash 5 parts, nitrate of potash 1 part; and treated as for sulphide

ENGLISH WEIGHTS AND MEASURES.

APOTHECARIES' WEIGHT.

SOLID MEASURE.	FLUID MEASURE.
20 grains = 1 scruple.	60 minimis = 1 drachm.
60 " = 1 drachm.	480 " = 8 " = 1 ounce.
480 " = 1 ounce.	160 drachms = 20 ounces = 1 pint.
12 ounces = 1 pound.	8 pints = 4 quarts = 1 gallon.

N.B.—It is important to remember that in all English photographic formulæ the solid and fluid measures of Apothecaries' Weight are used; but in buying and selling chemical articles the Avoirdupois Weight is employed.

AVOIRDUPOIS WEIGHT.

27·343 grains = 1 dram.
·437·5 " = 1 ounce.
16 ounces = 1 pound.

TROY WEIGHT.

24 grains = 1 pennyweight
20 dwts. = 1 ounce.
12 ounces = 1 pound.

FRENCH WEIGHTS AND MEASURES.

1 gramme weighs nearly $15\frac{1}{2}$ English grains (15.433).

1 " = 10 décigrammes = 100 centigrammes = 1,000 milligrammes.

1 kilogramme = 1,000 grammes = nearly $2\frac{1}{4}$ lbs. avoirdupois (2.247).

1 litre is equal to nearly $35\frac{1}{4}$ fluid ounces (35.2).

1 cubic centimetre is equal to nearly 17 minimis (16.896)

1 millimetre measures in length 0.0393 inches.

1 centimetre	"	"	0.393	"
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1 decimetre	"	"	3.937	"
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1 metre	"	"	39.370	"
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CHAPTER XXIV.

THE RECEPTION ROOM—HINTS TO SITTERS.

ALTHOUGH it is necessary to attract customers to our gallery, it is of greater importance that we retain them when we have secured their attention to our work; therefore our great care should be to satisfy them in the quality of the picture, rather than to gain a transient victory over their senses by a display of elegance in the fittings of the "reception room." I do not at all hold with a slovenly, shabby room for this purpose; but it should certainly not be furnished at the expense of the skylight and its apparatus, nor be bedecked with money that would have been more wisely spent in making complete the working departments of the business. The attraction should lie in the *quality* of the pictures produced, and success will be lasting.

The reception room.—Let this apartment be thoroughly cheerful; and under the charge of a lively, good-humoured, and business-like direction, a large store of "expression" may be always secured. From a business point of view I am decidedly in favour of a man having control of this department—one who thoroughly understands what

can be done, and what cannot, so that rash promises are never made. A man, too, has more influence over the wavering mind of the sitter, and can often induce a larger order than was originally intended.

Judicious choice of furniture and fittings, and the exercise of taste in arrangement, will often produce a charming effect with comparatively little expenditure.

Let your furniture be good of its kind, avoiding tumble-down gorgeousness and treacherous "elegance" of upholstery. If you have the artistic feeling a photographer should have, you will strive to secure in the carpet, wall decoration, pictures, curtains, furniture, and surroundings, a thoroughly harmonious and tasteful effect.

Specimens of the work of the gallery should be hung in frames on the wall, and especially should be prepared one of the different styles from which customers can make choice. This specimen frame may be numbered to correspond with a duplicate frame in the skylight, so that a number on the sitter's order will indicate what is required. Here the artistic knowledge of the reception room attendant is brought into play to suggest a suitable style, or to urge against the selection of an unsuitable.

A glass show-case is necessary for the preservation of coloured work, frames, mounts, passepartouts, &c., and a table for specimens, books, newspapers, magazines, and albums, for the beguilement of customers waiting their turn for sitting.

Little accessories—as, for instance, a fountain, flowers, or a case of ferns, a singing bird, &c.—may be introduced to form a very pleasant feature, and tend to do away with a great deal of the business-like character of the room.

Dressing rooms and laboratories should be convenient, nicely fitted, and kept scrupulously clean and well tended. These necessary rooms are, in so many galleries, not only

very imperfect in arrangement, and thoroughly inconvenient, but in such out-of-the-way places as to be almost a protest against the necessity for their existence ; whereas they should really be as well furnished in every respect as is possible.

BUSINESS HINTS.

In photography much depends on the impression produced on the minds of sitters by the manner in which they are received, and the surroundings of the gallery. The first and most lasting impression is made in the reception room ; therefore it will be only necessary here to remind you of the importance of cleanliness, neatness, politeness, and the ease of manner alluded to elsewhere as tending so much towards setting sitters at their ease, and charming "expression" (that bane of the photographer's existence) into sweetest serenity.

Appointments should be encouraged ; and in the order, regularity, and absence of flurry attending them, when strictly kept, the old awkward *regime* of promiscuous "dropping in," with the undelightful uncertainty attending, will pass away. The convenience and benefit to sitter and artist alike will surely be recognised by all who try it.

A sitter's order-book should be kept. The handiest form is a book with pages perforated down the centre, the outside half of each page (numbered consecutively) forming a receipt to the sitter, and containing the number of pictures required, style, and the date and time of appointment—the counterfoil being retained in the book for reference.

Re-sittings.—This is a question on which there is a great difference of opinion, and one on which a great deal may be said on the side of the public and the photographer—especially the latter. *If the picture is a bad one, of course,*

give another sitting ; if a good, but unsatisfactory, I think it is better to give the demanded second, or third, or —th sitting. You see we are on the horns of a dilemma : the customer says, "Another trial, or you lose my favour and custom ;" and it goes hard with us to decide whether it is better to lose our time or his love.

MISCELLANEOUS HINTS, AND SUGGESTIONS TO SITTERS.

When the sitter comes to secure an appointment, the reception room attendant is often questioned as to the suitability of a certain article of dress for the purposes of photographic portraiture ; or it may be noticed at the time of the first interview that certain points in the attire of the customer may be happy, or unsuitable, and suggestions made thereon. To do this successfully some artistic taste and knowledge of photographic requirements are necessary.

Sitters are generally willing to allow the photographer to be master in his own skylight if that position is maintained with dignity and firmness ; and it is only where self-reliance is wanting in the photographer that customers will think of airing their crotchets. There is, of course, a class of sitters who have decided opinions on art, and it must be the photographer's art to have as much his own way as possible, even when appearing to give in to the ideas of the sitter. Other persons there are who, having seen and admired the photograph of a friend, must have one exactly similar, without giving a thought as to the suitability of the treatment in their case. This is one of the photographer's thorns ; for satisfaction seldom results either in copying another picture, or in the modification sanctioned unwillingly by the sitter. Remember, "he that complies against his will, is of his own opinion still."

Then there are those who rush into a gallery, hot, tired and fussy, declaring they have only a few minutes to spare —either there is a train to be caught, or an appointment to be kept. Under these circumstances success is extremely rare, and the sitting merely a waste of time.

The photographer should strive to impress on his patrons the fact that much depends on them, in their willingness to submit implicitly to him in all matters of detail of the portrait, and not a little on the temper in which sitters enter the gallery: if worried, or in a hurry, the anxiety will tell its tale in the expression stamped on the picture.

A bright day is not necessary, or always desirable, the light on many cloudy days having more actinic power than the yellow glare of the beautiful sunshiny day.

Dress.—The real secret of success in this respect, so far as the photographer is concerned, is that the sitter is not "dressed for the occasion." Even in the event of the alteration of costume being for the better (as a matter of taste), the identity of the sitter is lost. Some sitters enjoy a comic misery in the choice of jewellery in which they bedeck themselves, generally putting on too much. Nor is this vice monopolized by those vulgar beings on whom we look down with the pitying scorn of superiority.

Remember always that the face makes the picture, and the dress, at best, is merely an aid to picturesqueness.

Some of the finest photographic portraits have been made where the shoulders of the sitter have been draped with a shawl, lace, cloak, or, not unfrequently, a photographer's curtain. I would advise every photographer to have ready several pieces of drapery in different shades of material which will fall in good folds. For this purpose nothing can be better than thin flannel or cloth.

Of ladies' dresses, repps, poplins, silks, and satins, naturally fold and drape well. Materials with too much gloss should be avoided, the contrast in light and shade being harsh and inartistic. Striped and boldly spotted dresses, and those with large patterns, should never be permitted, the effect in a photograph being too bewildering. Harmony between the complexion and dress should be studied, and, in regarding this rule, extremes of complexion are not exaggerated.

Of the colours, scarlet, claret, light orange, slate, magenta, crimson, buff, pea green, plum, dark purple, navy and mazarine blues, dove, ashes of rose, china and rose pinks, are excellent in photography, being reproduced as light and medium greys.

Snuff brown and dark Bismarck generally appear darker than a black silk or satin, and detail is almost always entirely lost.

Lavender, lilac, sky blue, and French blue are also to be avoided, as they are more troublesome in their white blankness than even pure white drapery.

In the dressing of the hair, avoid change from the ordinary style worn. A long face is considerably lengthened by the arrangement of the hair piled up on top of the head, and a broad face will appear much more so if the hair is brought down over the forehead.

The painful straight lines of a long neck may be considerably improved, in the case of a lady, by the adjustment of curls to break the line. Sometimes it is advisable to drape a lace shawl over the head, and supply compensating lines by its folds.

Powder is useful, but must be carefully used, on red, very black, and sometimes on very light hair, where, but for its use, detail would be wanting; but do not give the sitter's head a frosted appearance.

General Remarks to the Operator.—Do not make of the head-rest an instrument of torture.

Be firmly, but gently, master of the situation. Quietly combat unreasonable whims. Try to keep the sitter's mind from dwelling on the fact that he or she is sitting for a portrait, and don't permit any unnecessary delay to arise between the completion of the pose and the exposure of the plate.

Do not allow the interference of fussy friends—indeed, forbid their presence in the atelier.

Encourage the confidence of your sitters by a masterly treatment of your work.

And, above everything, and through every provocation,

KEEP YOUR TEMPER.



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